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CONTENTS:

Some new Willows of eastern America. <i>M. L. Fernald</i>	221
New Stations for two Vermont Plants. <i>Leston A. Wheeler</i>	227
New England species of <i>Penium</i> . <i>Joseph A. Cushman</i>	227
Errata	234
Index	235

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THE NEW ENGLAND BOTANICAL CLUB

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SOME NEW WILLOWS OF EASTERN AMERICA.

M. L. FERNALD.

RECENT explorations of the eastern portion of the Province of Quebec have brought to light many willows which have hitherto been unknown in eastern America. Some of these shrubs, such as *Salix pseudo-myrsinites* Anders., *S. Barclayi* Anders., and *S. fuscescens* Anders., have been previously known only from the northwestern Provinces or from Alaska; the unique *S. Richardsoni* Hook., var. *Macouniana* Bebb has been known only from Hudson Bay and northern Labrador; while some others it has been impossible to identify with any described species or varieties.

The most abundant of these undescribed willows are two large shrubs or small trees which abound on the terraces and banks of the St. Lawrence at least from Matane to the River Ste. Anne des Monts, and probably beyond, and for several miles inland in the valley of that river. One of these trees, which in its best development is about 15 feet high, with wide-spreading branches, has the largest leaves known to the writer in any member of the *Diandrae*, the mature blades often reaching a length of 5 or 6 inches. This handsome large species may appropriately be called

SALIX laurentiana n. sp. Frutex altus vel arbor mediocris, ramis crassis junioribus canescento-tomentosis; foliis oblongis vel oblongo-obovatis acutis vel breviter acuminatis junioribus dense albo-pubescentibus, demum supra glabris viridibus lucidis subtus glaucescentibus 6-14 cm. longis 3-4.5 cm. latis subintegris vel leviter crenatis, petiolis gracilibus circa 1.5 cm. longis tomentosis; stipulis late ovatis deciduis; amentis gracilibus pedunculatis foliis parvis 3-5 suffultis patulis, femineis densifloris fructiferis 4-9 cm. longis 1 cm. crassis; squamis oblongis obtusis fuscis longe pilosis; capsulis conico-subulatis obtusis canescento-tomentosis 5-6 mm. longis pedicellatis, pedi-

cello nectarium triplo superante; stylo brevissimo, stigmatibus bifidis.

Large shrub or small widely branching tree, 2-5 m. high; branchlets coarse, canescent-tomentose, the pubescence slightly lustrous; leaves oblong to oblong-obovate, at first silky-tomentose on both surfaces, in maturity bright green and glabrate above, glabrate and glaucous beneath, 6-14 cm. long, 3-4.5 cm. broad, subentire or shallowly crenate, acute or short-acuminate, rounded at base to the tomentose petiole (about 1.5 cm. long); stipules round-ovate, deciduous; aments borne upon short leafy branches, the pistillate dense, on canescent peduncles, 4-9 cm. long, about 1 cm. thick; scales oblong, obtuse, dark brown, long-pilose; capsule conic-subulate, blunt, canescent-tomentose, 5-6 mm. long; pedicel 1-2 mm. long, thrice as long as the nectary; style 0.5 mm. long, the stigmas deeply cleft.—QUEBEC, abundant on terraces and banks of the St. Lawrence River from Matane, Matane Co., to Ruisseau Castor, Gaspé Co., and probably eastward. Type material: in fruit, Méchins, Gaspé Co., July 12, 1906 (*Fernald & Collins*, no. 202); in mature foliage, calcareous-sandstone sea-cliffs, Tourelle, Gaspé Co., August 19-21, 1905 (*Fernald & Collins*).

A handsome and very characteristic large-leaved shrub or small tree, suggesting in its foliage and tomentose branchlets *S. amplifolia* Coville, of Alaska, which has slightly smaller leaves, no stipules, thicker aments (1.5-2 cm. in thickness), the ovary and capsule smooth, and the style 3-4 mm. long. From the eastern *S. glaucophylla*, which abounds along the rivers of northern Maine, New Brunswick and Quebec, *S. laurentiana* is, likewise, immediately distinguished by its tomentose capsules, as well as the aments terminating leafy twigs instead of being sessile or subsessile upon the old wood.

The other undescribed willow which is associated on the banks of the lower St. Lawrence with *S. laurentiana*, *S. pellita* Anders., *S. lucida*, var. *intonsa* Fernald, and *S. rostrata* Richardson, has a wider distribution than *S. laurentiana*, for it has been observed in abundance up the river from Matane as far as St. Fabien in Rimouski County and it doubtless extends further west. This large shrub or small tree, sometimes 20 feet high with trunks 6 inches in diameter, is clearly an extreme variation of the common *S. rostrata*. In the typical form of the species as well as in such variations as I find described the leaves are more or less rugose and comparatively small, the mature pedicels are from 3 to 5 mm. long, and the capsules 5 to 9 mm. long. The larger extreme of the species from the lower St. Lawrence may be called

SALIX *ROSTRATA* Richardson, var. *luxurians* n. var. Arbor 2–6 m. alta, trunco 1–1.5 dm. crasso; foliis planis non rugosis 6–10 cm. longis; amentis femineis 2.5–3 cm. crassis, pedicellis 5–8.5 cm. longis; capsulis 9–12 mm. longis.

Tree 2–6 m. high, the larger trunks 1–1.5 dm. in diameter, with the nearly plane scarcely rugose leaves becoming 1 dm. long in maturity; mature pistillate aments very large, 2.5–3 cm. thick; pedicels 5–8.5 mm. long; capsules 9–12 mm. long.—*QUEBEC*, abundant on banks of the St. Lawrence from Rimouski Co. to Gaspé Co. Type material: limestone ledges, Bic., July 4–6, 1906 (*Fernald & Collins*, nos. 208, 495).

Along the gravelly half-inundated margin of the River Ste. Anne des Monts occurs an unusually attractive little shrub, its slender smooth branches rarely more than 2 or 3 feet high and its short oblong or suborbicular dentate leaves suggesting to the casual observer the foliage of the common *Amelanchier spicata* (Lam.) C. Koch. (*A. rotundifolia* Roem.) of the region, rather than that of any of our willows. Prolonged study fails to show any American willow to which it is nearly related, but in foliage as well as in its sessile aments the shrub very strongly suggests the little known Siberian *Salix pyrolae-folia* Ledeb. as shown in Ledebour's beautiful plate. From that unique species the shrub of the Ste. Anne River differs in several important characters enumerated below, and it seems sufficiently distinct to merit the name

SALIX obtusata n. sp. Frutex parvus, ramis gracilibus castaneis glaberrimis; foliis oblongis vel terminalibus suborbiculatis 2–5 cm. longis 1–3 cm. latis dentato-serratis apice rotundatis basi rotundatis vel subcordatis junioribus arachnoideis tenuissimis pellucidis purpurascentibus demum coriaceis glabris supra viridibus subtus pallidioribus, petiolis gracilibus 5–12 mm. longis; stipulis cordatis persistentibus majoribus 5 mm. longis obscure glanduloso-dentatis; amentis sessilibus, femineis 5–20 mm. longis; squamis oblongo-ovatis obtusis subfuscis laxè villosis; capsulis glabris conico-subulatis rufescentibus vel flavescentibus 2–3 mm. longis breviter pedicellatis, pedicello nectarium valde superante; stylo parvo, stigmatibus minimus bifidis.

Low slender shrub (0.5–1 m. high): branchlets slender, glossy brown, glabrous: leaves oblong to suborbicular, 2–5 cm. long, 1–3 cm. broad, closely dentate-serrate, rounded or subcordate at base, rounded at apex, glabrous, or the youngest arachnoid-tomentose, at first thin and purple-tinged; later coriaceous, bright green above, slightly glaucous beneath; petiole slender, 5–12 mm. long: stipules cordate, persistent, the largest about 5 mm. long, obscurely glandular-

dentate: aments sessile upon the old wood, the pistillate short-cylindric, 0.5–2 cm. long: scales oblong-obovate, obtuse, brownish, loosely villous: capsule glabrous, conic-subulate, reddish or yellowish, 2–3 mm. long: pedicel 0.5 mm. long, much exceeding the very short nectary: style very short, the stigmas bifid; staminate aments not seen.—QUEBEC, inundated gravelly bars and beaches, River Ste. Anne des Monts, fruit July 15, 1906, mature foliage August 16, 1906 (*Fernald & Collins*, nos. 203, 203a).

Closely allied to and strongly simulating the Siberian *S. pyrolaeifolia* Ledeb. but differing in its more shallowly toothed leaves, shorter sessile aments and very short style. The type specimens were collected from characteristic low shrubs associated with a number of other willows — *S. cordata*, *S. pellita*, *S. glaucophylla*, &c.— at the frequently inundated margins of a group of alluvial islands near the head of the Grand Rapids of the River Ste. Anne des Monts.

Salix fuscescens Anders., hitherto known only from northern and western Alaska and the adjacent coast of Siberia, is abundant in bogs on the serpentine tableland of Mt. Albert. It is a very attractive creeping shrub, in foliage and other characters strongly suggesting *S. pedicellaris* Pursh of our northern temperate regions (*S. myrtilloides* of American authors, not L.). From the lowland species, *S. fuscescens* is quickly distinguished by its usually obovate leaves, the more pubescent scales of the aments, the very short thickish pedicels (barely exceeding the scales), the long subulate nectary which is usually half as long as the pedicel, and the definite though short style. As stated, this attractive species is abundant in the bogs of Mt. Albert, where it is associated with numerous other plants typical of western and northern Alaska and adjacent Siberia — *Eriophorum Chamissonis* C. A. Meyer, *Conioselinum Gmelini* (C. & S.) Coulter & Rose, *Festuca altaica* Trin., &c.,— and although many colonies have the capsules quite glabrous as in the type of the species, others occupying extensive areas of bog, have the capsules distinctly pilose. These shrubs with pilose capsules seem otherwise identical with typical *S. fuscescens* and they may be designated

SALIX FUSCESCENS Anders., var. **hebecarpa** n. var. Frutex parvus, ramis subflagelliformibus; foliis amentisque eis formae typicae similibus; capsulis pilosis.

Capsules pilose; characters otherwise as in the typical form.—QUEBEC, alpine bog, tableland of Mt. Albert, Gaspé Co., July 21, 1906 (*Fernald & Collins*, no. 207).

While studying the specimens and descriptions of Labrador willows the writer has often wondered that *Salix adenophylla* should have been described as a unique species from Labrador and that we should now know the plant only from the sand dunes of the Great Lakes. A careful study of Hooker's original description of *S. adenophylla* and of Andersson's fuller descriptions of the type material shows that the shrub of the Great Lakes can have no close affinity with *S. adenophylla* and it is here proposed as

SALIX syrticola n. sp. Frutex altus vel mediocris laxe procumbens, ramis crassis cinereo-tomentosis vel puberulis; foliis ovatis vel late lanceolatis acuminatis cordatis vel subcordatis crebre glanduloso-serrulatis junioribus sericeo-lanatis demum firmis viridibus opacis lanatis vel glabris 3–10 cm. longis 2–5 cm. latis, petiolis brevibus latis cinereo-pubescentibus; stipulis conspicuis foliaceis cordato-ovatis glanduloso-serrulatis petiolos valde superantibus; amentis pedunculatis foliis patulis 3–6 suffultis, masculis 2.5–4.5 cm. longis circa 1 cm. crassis, femineis 2–4.5 demum 5–10 cm. longis 1–1.5 cm. crassis; squamis oblongis fulvis valde tomentosis vel longe sericeis; capsulis conico-subulatis glabris rufescentibus 5–7 mm. longis basi rotundatis vel subcordatis pedicellatis, pedicello glabro 0.5–1 mm. longo nectarium prope triplo superante; stylo 0.5–1 mm. longo, stigmatibus vix bifidis.

Large straggling shrub: branchlets stout, cinereous-tomentose or -puberulent; leaves ovate to broadly lanceolate, acuminate, cordate or subcordate, closely glandular-serrulate, silky-lanate when young, often becoming glabrate, in maturity firm, dull green, 3–10 cm. long, 2–5 cm. broad; petioles short and broad, dilated at base, cinereous-pubescent: stipules conspicuous, foliaceous, cordate-ovate, glandular-serrulate, much exceeding the petioles: bud-scales cinereous-tomentose: aments appearing with the leaves, on leafy-bracted peduncles, the bracts 3–6, resembling the leaves; staminate aments 2.5–4.5 cm. long, about 1 cm. thick; pistillate 2–4.5, becoming in fruit 5–10 cm. long, 1–1.5 cm. thick: scales oblong, pale brown, very densely long-silky or tomentose: capsule conic-subulate, glabrous, rufescent, 5–7 mm. long, rounded or subcordate at base: pedicel glabrous, 0.5–1 mm. long, nearly twice as long as the nectary: style 0.5–1 mm. long; stigmas obscurely bifid: stamens 2, the filaments glabrous.—*S. adenophylla* Bebb, The Lens, ii. 249 (1873), and in Gray, Man. ed. 6, 485 (1890); Britton in Britton & Brown, Ill. Fl. i. 504, fig. 1203 (1896); not Hook. Fl. Bor. Am. ii. 146 (1839).—Sand dunes and beaches along the Great Lakes. A sheet in the Gray Herbarium from sandy shores of Lake Michigan, near Chicago, *H. H. Babcock*, 1880 (Bebb, Herbarium Salicum, no. 2) may serve as the type.

This handsome shrub is one of the best marked species in the group,

and apparently only through his extreme caution in characterizing new species was it allowed by Mr. Bebb to pass so long for the little known *Salix adenophylla* Hook. Hooker's species from Labrador is still known only from the original specimens and descriptions, but so many of the older and hitherto obscure northern species have recently come to light that we may confidently hope soon to understand more clearly *S. adenophylla*. At present our best information upon this species is that given in the original description by Hooker and later from the type material by Andersson. It is noteworthy that Hooker, following the system of Barratt, placed his Labradorean *S. adenophylla* immediately after *S. speciosa* and *S. Barrattiana* (two of our most remarkable willows, with the large aments chiefly sessile at the tips of the old branchlets) and not in the section with *S. cordata* to which *S. syrticola*, the shrub of the Great Lake region, is clearly related.

The original description of *S. adenophylla* gives account of little besides the leaves: "foliis ovatis basi cordatis acutis . . . argute serratis serraturis elongatis glanduliferis . . . stipulis ovato-cordatis grosse glanduloso-serratis";¹ but that the elongate glanduliferous serratures were sufficient in Hooker's mind to distinguish the species is shown by his note: "I know no species like this, well marked as it is by the copious long narrow serratures to the leaves tipped with a gland, so that the leaf looks as if it were fringed with pedicellated glands."¹ This remarkable character of the foliage is sufficient, even if the habitat, Labrador, were not almost convincing, to show that Hooker's plant could not have been the same as the common sand dune shrub of the Great Lakes; and when we refer to Andersson's account² of the Hookerian type, we find added corroboration in the statements of other characters: "folia . . . majora pollicem longa" (in *S. syrticola* the larger are a full decimeter — 4 inches — long, and the smallest examined are 3 cm. long); the fully mature fruiting ament "1½ poll. longa" (in *S. syrticola* 5–10 cm. — 2–4 inches); "squamis . . . glabriusculis" (in *S. syrticola* very densely and persistently long-silky or tomentose); "pedicello cinereo" (in *S. syrticola* glabrous and straw-colored).

GRAY HERBARIUM.

¹ Hook, Fl. Bor.-Am. ii, 146 (1839).

² DC. Prodr. xvi, 254 (1864).

NEW STATIONS FOR TWO VERMONT PLANTS.—This season I found beside the road, near the long bridge across West River, about a mile above Townshend village, a plant which proved to be *Berteroa incana*, DC. It was growing in considerable abundance in a light sandy field.

Up to the time of the publication of the Brainerd, Jones, and Eggleston's Flora of Vermont this plant had been reported from but three stations in the state.

I have found *Sisymbrium altissimum*, L. in two places in Jamaica this season: one in our strawberry field and again in a neighbor's door-yard. Mr. Dobbin of Shushan, New York, while in town this year, found it beside the railroad above Jamaica depot. This also seems to be one of the infrequent but increasing Vermont plants.—LESTON A. WHEELER, Jamaica, Vermont.

NEW ENGLAND SPECIES OF PENIUM.

JOSEPH A. CUSHMAN.

SPECIES of the genus *Penium* cannot be called common in New England although specimens are usually met with in nearly all gatherings of Desmids of any richness. Many of the species are inconspicuous and a few of them minute. Twenty-eight species are known from the British Isles while but twelve are recorded here from New England. Two of these are recorded here for the first time. The forms which have not been previously recorded are preceded by an asterisk. All records for which specimens have been seen are followed by an exclamation point. A brief synonymy is given to clear up some of the names used in American works and to give references to published figures. A key is given to the species recorded here, based upon that of the Wests. Measurements and descriptions unless otherwise stated are based upon New England specimens.

PENIUM Bréb., 1844.

Cells straight, usually cylindrical or fusiform, with or without a slight median constriction; each semicell with a single axile chloro-

plast with radiating plates, entire at the outer edges, each chloroplast with one or more pyrenoids, when several, in an axile series; cell wall usually with pores.

KEY TO THE NEW ENGLAND SPECIES OF PENIUM.

- I Cells unconstricted, smooth.
 - 1. Cells large, breadth 20–50 μ *P. Libellula*.
 - 2. Cells small, breadth 10–15 μ *P. Navicula*.
- II Cells usually constricted in the middle .
 - 1. Cell wall granulate.
 - A. Cell wall granulate over its entire surface.
 - a. Cells large, usually more than 100 μ long *P. margaritaceum*.
 - b. Cells minute, usually less than 30 μ long *P. cuticulare*.
 - B. Granules restricted to the ends of the cell *P. Clevei*.
 - 2. Cell wall striated.
 - A. Cells large, striations distinct, spirally arranged *P. spirostriolatum*.
 - B. Cells small, striations longitudinal and indistinct.
 - a. Breadth usually more than 20 μ *P. polymorphum*.
 - b. Breadth usually less than 20 μ *P. phymatosporum*.
 - 3. Cell wall smooth or punctate.
 - A. Cells 2–4 times as long as broad.
 - a. Cell wall punctate *P. curtum*.
 - b. Cell wall smooth *P. cruciferum*.
 - B. Cell elongate, many times as long as broad *P. minutum*.
 - 4. Cell with annulations *P. annulare*.

PENIUM LIBELLULA (Focke) Nordst.

Closterium Libellula Focke, Physiologische Studien, 1847, p. 58, pl. 3, fig. 29.

Penium Libellula Nordst., Videnskab. Meddel. f. d. naturh. Foren. i. Kjöbenhavn, 1888. p. 184; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 73, pl. 7, figs. 6, 7.

Penium closterioides Ralfs, Brit. Desm., 1848, p. 152, pl. 34, fig. 4; Wood, Smithson. Contrib. to Knowl. No. 241, 1874, p. 109; Wolle, Desm. U. S., 1884, p. 35, pl. 5, fig. 18.

Cells large, $4\frac{1}{2}$ – $6\frac{1}{2}$ times as long as wide, fusiform, no constriction, ends subtruncate, polar vacuoles with several moving granules.

Length 186–233 μ ; maximum breadth 38–50 μ .

N. H.: Intervale, scarce! Pudding Pond, North Conway, common!

North Woodstock, common! Mass.: Medford! Bridgewater! East Bridgewater! Lake Watuppa, Fall River!

PENIUM LIBELLULA, var. *INTERRUPTUM* (West) W. & G. S. West.

Penium closterioides, forma *interrupta* West, Journ. Roy. Micr. Soc., 1892, p. 721.

Penium Libellula, var. *interruptum* W. & G. S. West, Journ. Roy. Micr. Soc., 1897, p. 479; Brit. Desm., vol. 1, 1904, p. 74, pl. 7, figs. 9, 10.

Smaller than the typical form, the chloroplasts divided three times transversely, therefore in each cell four chloroplasts each containing a pyrenoid.

Length 120–170 μ ; breadth 22–37 μ .

N. H.: Pudding Pond, North Conway! Mass.: Pondville! Plainville!

PENIUM LIBELLULA, var. *INTERMEDIUM* Roy & Biss.

Penium Libellula, var. *intermedium* Roy & Biss., Ann. Scot. Nat. Hist., No. 12, Oct. 1894, p. 252; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 74, pl. 7, fig. 11.

Differs from the typical form in size, being about one half the size, otherwise typical.

Length 124 μ ; breadth 22 μ .

Mass.: Pondville!

PENIUM NAVICULA Bréb.

Penium Navicula Bréb., Mem. d. l. soc. imp. sc. nat. Cherbourg, vol. 4, 1856, p. 146, pl. 2, fig. 37; Wolle, Desm. U. S., 1884, p. 36, pl. 5, fig. 16; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 75, pl. 7, fig. 12–15, 19.

Cells small, $3\frac{1}{2}$ – $4\frac{1}{2}$ times as long as wide, fusiform, no constriction, ends broadly rounded, vacuoles with two or three moving granules.

Length 55–60 μ ; breadth 14 μ .

Me.: Orono (W. West); Mass.: Plainville! Lake Watuppa, Fall River!

PENIUM MARGARITACEUM (Ehrenb.) Bréb.

Closterium margaritaceum Ehrenb., Die Infusionthierchen als vollkommene Organismen, 1838, p. 95, pl. 6, fig. XIII.

Penium margaritaceum Bréb., in Ralfs. Brit. Desm., 1848, p. 149, pl. 25, fig. 1, *a-c*; Wood, Smithson. Contrib. to Knowl. No. 241, 1874, p. 107; Wolle, Desm. U. S., 1884, p. 34, pl. 5, figs. 5, 6, 11; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 83, pl. 8, figs. 32-35.

Cells 7-11 times as long as wide, cylindrical, median constriction present, ends broadly or truncately rounded, cell wall with granules arranged in longitudinal rows, reddish or yellowish brown in color.

Length 120-240 μ ; breadth 17-22 μ ; apices 12-15 μ .

Me.: Orono (*Harvey*), Kittery, not common! N. H.: Plymouth (*Wests*); Pudding Pond, North Conway! Intervale! Vt.: (*Wolle*); Mass.: Amherst (W. West); Lake Quinsigamond, Worcester (*Stone*); Bridgewater! Lake Watuppa, Fall River! R. I.: Wainskut Pond, North Providence (Bailey); Conn.: (*Wolle*).

This is one of our most striking species and easily noted, yet cannot be called common.

* *PENIUM CUTICULARE* W. & G. S. West.

Penium cuticulare W. & G. S. West, Journ. Roy. Micr. Soc., 1896, p. 153, pl. 4, figs. 43, 44; Brit. Desm., vol. 1, 1904, p. 85, pl. 6, figs. 4, 5.

Cells minute, $2\frac{1}{2}$ times as long as wide, cylindrical, no constriction, ends broadly and truncately rounded, cell-wall reddish brown, minutely but irregularly papillose.

Length 22 μ ; breadth 9.3 μ .

Mass.: Lake Watuppa, Fall River!

PENIUM CLEVEI Lund., var. *CRASSUM* W. & G. S. West.

Penium Clevei Lund. Desm. Suec., 1871, p. 86, pl. 5, fig. 11; var. *crassum* W. & G. S. West, Journ. Roy. Micr. Soc., 1894, p. 4, pl. 1, fig. 5; Brit. Desm., vol. 1, 1904, p. 88, pl. 8, fig. 38; Cushman, Bull. Torrey Club, vol. 32, 1905, p. 225, pl. 7, fig. 8.

Cells about twice as long as wide, lateral margins decidedly convex, slightly constricted in the middle, ends of the cell finely granulate, chloroplast with a single large pyrenoid. Zygosporc spherical, with numerous broad, squarely truncated processes.

Length 80-96 μ ; breadth 40-44 μ ; isthmus 38.5-40 μ ; breadth of zygosporc with processes 68-78 μ ; without processes 54-57 μ .

Mass.: Pondville!

This is the only record for the zygosporc of this species.

PENIUM SPIROSTRIOLATUM Barker.

Penium margaritaceum, var. *punctatum* Ralfs, Brit. Desm., 1848, p. 149, pl. 25, figs. 1, *d-h*.

Penium spirostriolatum Barker, in Quart. Journ. Micr. Sci., vol. 9, 1869, p. 194; Wolle, Freshw. Alg. U. S., 1887, p. 22, pl. 61, fig. 19; G. S. West, Journ. Linn. Soc. Bot., vol. 34, 1899, p. 377-380; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 88, pl. 9, figs. 1-8.

Cells large, about 9 times as long as wide, cylindrical, with a slight median constriction, slightly attenuated toward the rounded apices, transverse sutures apparent, cell wall yellowish brown, marked with longitudinal striae, variably twisted especially near the ends of the cell.

Length 202-233 μ ; breadth 19-25 μ ; apex 15-16 μ .

Me.: Orono (*W. West*); Mass.: Winchester! Lake Watuppa, Fall River!

* PENIUM SPIROSTRIOLATUM, var. *apiculatum* var. nov.

Cells about four times as long as wide, central portion cylindrical, at each end very abruptly narrowed for about one-sixth of the length.

Length 84 μ ; breadth 21 μ ; apices 11.5 μ .

Mass.: Plymouth!

PENIUM POLYMORPHUM Perty.

Closterium polymorphum Perty, in Bern. Mitth. 1849, p. 28.

Penium polymorphum Perty, Kleinist Lebensf., 1852, p. 207; Wolle, Desm. U. S., 1884, p. 36, pl. 5, fig. 12; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 90, pl. 9, figs. 9-11.

Cells small, about $2\frac{1}{2}$ times as long as wide, cylindrical with a slight median constriction, very slightly attenuated toward the broadly rounded apices, cell-wall with inconspicuous, longitudinal striations.

Length 50 μ ; breadth 20 μ .

Vt.: Charlotte (*Wolle*); N. H.: Pudding Pond, North Conway, occasional! Mass.: Amherst (*W. West*).

PENIUM PHYMATOSPORUM Nordst.

Penium phymatosporum Nordst., Desm. Ital., 1876, p. 26, pl. 12, fig. 1; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 91, pl. 6, figs. 9-11.

Cells small, about $2\frac{1}{4}$ times as long as wide, with a very slight constriction, very slightly attenuated toward the truncately rounded apices, cell wall with delicate longitudinal striations.

Length 35–40 μ ; breadth 15.5–16.5 μ ; isthmus 13.5 μ .

Mass.: Tom Never's Pond and pond near Old North Cemetery, Nantucket!

PENIUM CURTUM Bréb.

Closterium curtum Bréb., in Desm., 1838, fasc. 19, No. 901.

Cosmarium curtum Ralfs. Brit. Desm., 1848, p. 109, pl. 32, fig. 9.

Penium curtum Bréb., in Kütz., Spec Alg., 1849, p. 167; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 97, pl. 10, figs. 21, 22.

Calocylinthus curtus Wolle, Desm. U. S., 1884, p. 54, pl. 12, figs. 15, 16.

"Cells small, sometimes minute, a little more than twice longer than their diameter, with a distinct median constriction; semi-cells attenuated, sides convex, apex rounded and sometimes slightly thickened; cell wall punctate; chloroplasts with about eight longitudinal ridges."

Length 22–60 μ ; breadth 10.5–32.5 μ ; breadth of isthmus 9.5–30 μ .

Mass.: Amherst (W. West).

Personally I have not met with this species in New England. It has been found in Massachusetts by West and in several states outside of New England by Wolle. The description and measurements are from the Wests' British Desmids.

* PENIUM CRUCIFERUM (DeBary) Wittr.

Cosmarium? cruciferum DeBary, Conj., 1858, p. 72, pl. 7, G, figs. 3–6.

Penium cruciferum Wittr., in Wittr. & Nordst., Alg. Exsicc. No. 482, 1882; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 100, pl. 10, figs. 18, 19.

Cells small, about $1\frac{1}{2}$ times as long as wide, with a slight median constriction, apices broadly rounded, cell wall smooth and colorless.

Length 15.5 μ ; breadth 10 μ ; isthmus 9.3 μ .

Mass.: Lake Watuppa, Fall River, common!

PENIUM MINUTUM (Ralfs) Cleve.

Docidium minutum Ralfs., Brit. Desm., 1848, p. 158, pl. 26, fig. 5; Wolle, Desm. U. S., 1884, p. 52, pl. 10, fig. 9, pl. 50, figs. 29–31.

Penium minutum Cleve, Ofvers. af K. Vet.-Akad. Förh., 1864, p. 493; Wolle, Desm. U. S., 1884, p. 35, pl. 5, figs. 19, 20; W. & G. S. West, Brit. Desm., vol. 1, 1904, p. 101, pl. 10, figs. 1, 2.

Calocylinthus minutus Wolle, Desm. U. S., 1884, p. 54, pl. 5, figs. 19, 20, pl. 12, fig. 12.

Cells elongate cylindrical, 8–12 times as long as wide, with a clearly defined median constriction, gradually attenuated to the truncate apices, cell wall colorless, smooth or punctate.

Length 114 μ ; breadth 13 μ .

Mass.: Lake Quinsigamond, Worcester (*Stone*); Tewksbury (*Lagerheim*); R. I.: (*Bailey*).

I have not as yet found the typical form in New England. The measurements are those given by Lagerheim of a Massachusetts specimen.

PENIUM MINUTUM, var. ELONGATUM W. & G. S. West.

Penium minutum, var. *elongatum* W. & G. S. West, Trans. Linn. Soc. Ser. 2, Bot. vol. 6, no. 3, 1902, p. 136; Brit. Desm., vol. 1, 1904, p. 104, pl. 10, fig. 8.

Cells much longer than in the typical form, 40 times as long as wide.

Length 372 μ ; breadth 9 μ .

N. H.: Pudding Pond, North Conway!

PENIUM ANNULARE West.

Penium annulare West, Journ. Bot., vol. 29, 1891, p. 354, pl. 315, figs. 5, 6; Johnson, Bull. Torrey Club, vol. 21, 1895, p. 290, pl. 239, fig. 1.

“*Penium* of medium size, about 7 times as long as wide, subcylindrical, with median constriction (or subconstricted), gradually attenuated from the middle to the subtruncate apices, with distinct annulations (about 14–22): in end view circular; cell wall colorless, densely and irregularly punctate.”

Length 130–177 μ ; breadth 20–23 μ .

Me.: Scarbro', abundant (*W. West*). This is the type locality.

PENIUM ANNULARE, var. OBESUM West.

Penium annulare, var. *obesum* West. Journ. Bot., vol. 29, 1891, p. 354, pl. 315, fig. 7.

"Variety about 3 times as long as wide, with fewer annulations (about 9)."

Length 106 μ ; breadth 31-34 μ .

Me.: Scarbro', rare (*W. West*). Type locality.

I have not seen this species although the type locality is in Maine. There are three other stations for this species in the United States but it has not been found in New England since its first discovery. The descriptions are rough translations of the originals. The measurements are those given by West.

BOSTON SOCIETY OF NATURAL HISTORY.

ERRATA.

- Page 24, line 15; for *atropurpurea*, *Juncu* read *atropurpurea*,
Juncus.
- " 54, " 5; for Razoumowsk a read Razoumowskia.
- " 55, " 2; " Med k read Medik.
- " 64, " 1; " use read rise.
- " 116, " 8; " *microphyllum* read *semiorbiculatum*.
- " 122, " 7; " *Amonum* read *Amomum*.
- " 124, " 27; " *Cyprepedium* read *Cypripedium*.
- " 126, " 1; " *amphirhyncus* read *amphirhynchus*.
- " 129, " 9; " *strigilis* read *strigile*.
- " 130, " 1; " *Ditylum* read *Ditylium*.
- " 132, " 1; after *Navicula* insert *nobilis*.
- " 148, " 12; for *Laubholzkunde* read *Laubholzkunde*.
- " 164, " 25; for *Wormskjoldii* read *Wormskioldii*.
- " 199, " 14; for *Herbipolenis* read *Herbipolensis*.
- " 199, " 37; " *Aromachys* read *Aromochelys*.

Vol. 9, no. 107, including pages 209 to 220, was issued 10 December, 1907.

INDEX TO VOLUME 9.

New scientific names are printed in full face type.

- Abies balsamea*, 158, 169; *nigra*, 173.
Acanthospermum, 26; *australe*, 26, at Lawrence, Massachusetts, 26.
Acer coccineum, 116; *eriocarpum*, 116; *glaucum*, 116; *microphyllum*, 116, 117; *rubrum*, 116, 117, subsp. *microphyllum*, 116, var. *tomentosum*, 116, var. *tridens*, 116, 117; *saccharinum*, 116; *semi-orbiculatum*, 116, 117; *tomentosum*, 116, 117.
Achillea borealis, 164, 191.
Achnanthes brevipes, 136; *curvistrum*, 136; *longipes*, 136; *manifera*, 136; *subsessilis*, 136.
Achnanthidium flexellum, 131, 136.
Acosmus, 44.
Acroxis, 18.
Actinella punctata, 138.
Actinocyclus Barkleyi, 129, 139; *crassus*, 139; *Ehrenbergii*, 139; *Ralfsii*, 139; *subtilis*, 139; *tenuissimus*, 139; *triradiatus*, 139.
Actinoptychus, 130; *undulatus*, 140; *velatus*, 140.
Adenosilla, 37.
Adiantum, 27, 82, 174; *Capillus-Veneris*, 39; *pedatum*, 82, var. *aleuticum*, 155, 158, 167, 174.
Adicea, 54.
Adnaria, 54.
Adopogon, 55.
Aecidium, 195.
Agaricus octogesimus nonus, 51.
Ageratum, 50.
Agrostis borealis, 156, 158, 169, 190; *diffusa*, 20, 21; *filiformis*, 19; *foliosa*, 19; *frondosa*, 19; *lateriflora*, 18, var. *filiformis*, 19; *mexicana*, 18, 19; *racemosa*, 22; *setosa*, 22; *sobolifera*, 18; *sylvatica*, 18, 20; *tenuiflora*, 18.
Ailanthus, 54.
Alacosphermum, 54.
Alchemilla, 92; *alpina*, subsp. *eualpina*, 47; *pratensis*, 92, found at Westford, Massachusetts, 92.
Alexitoxicon, 40.
Algae, 36, 77, 78; The Basis of Nomenclature for, 77; Causes of Variation in Color of some red, 90; Red, 90; Some new green, 197.
Alicularia, 58; *Geoscyphus*, 57; *minor*, 57; *Roteana*, 58; *scalaris*, β *minor*, 57, 58.
Allium tricoccum, 12; *vineale*, 12.
Alnus, 18; *alnobetula*, 153; *crispa*, 153, 156, 160, 190; *incana*, 48; *lanuginosa*, 48; *mollis*, 160.
Alpine Rhinanthus of Quebec and New Hampshire, 23; Variety of *Houstonia caerulea*, 209.
Amaryllidaceae, 50.
Amelanchier, 179; *oligocarpa*, 156; *rotundifolia*, 223; *spicata*, 223.
America, The Genus *Suaeda* in northeastern, 140; *Salicornia europaea* and its Representatives in eastern, 204; Some new Willows of eastern, 221; Variations of *Primula farinosa* in northeastern, 15.
American Diervillas, Flower Color of the, 147.
Ammophila arenaria \times *Calamagrostis epigeios*, 42; *arundinacea*, 218; \times *baltica*, 42.
Amphicarpaea, 54; *Pitcheri*, 12.
Amphiprora, 130; *alata*, 135; *conspicua*, 135; *lepidoptera*, 135, var. *pusilla*, 135; *maxima*, 135; *ornata*, 135; *pulchra*, 128, 135; *vitrea*, 135.
Amphiptetras, 130; *antediluvianus*, 139.
Amphora, 128, 130; *cingulata*, 135; *Clevei*, 135; *cymbifera*, 135; *erebi*, 135; *Eulensteinii*, 135; *intersecta*, 135; *levis*, 135; *obtusata*, 136; *ovalis*, 136; *proteus*, 135.
Amsinckia, 55.
Anaphalis margaritacea, 122.
Anarrhinum, sect. *Anarrhinum*, 47.
Andromeda glaucophylla, 163, 169, 189; *tetragona*, 182.
Andropogon macrothrix, 40; *ternatus*, subsp. *macrothrix*, 40.
Anemone multifida, 161, 166; *parviflora*, 161, 166, 183, 190; *riparia*, 161.
Anemonella, 151; *thalictroides*, 151.
Angiospermae, 36.

- Anidrum, 54.
 Ankleberries, 5.
 Annual Field Meeting of the Vermont Botanical and Bird Clubs, Thirteenth, 108; Meeting of the Josselyn Botanical Society, Thirteenth, 107.
 Antennaria neodioica, var. *gaspensis*, 164.
 Anthoceros, 219.
 Anthriscus, sect. *Eu-anthriscus*, 47.
 Apios tuberosa, 13.
 Arabis, 40; *alpina*, 161, 190, 191; *Collinsii*, 161; *Drummondii*, 161; *hirsuta*, 161; *spatulata*, 40.
 Aralia hispida, 122; *trifolia*, 13.
 Arbor Vitae, 163.
 Arbutus Uva-ursi, 182.
 Arceuthobium, 54, 75, 76, 208, in the Rangeley Region, 28; *pusillum*, 28, 76, 124, 208, at Mt. Desert, 75.
 Archieracium, 37.
 Arctostaphylos alpina, 163, 166; *Uva-ursi*, 163, 181, 182.
 Ardissonia superba, 137.
 Arenaria, 63; *arctica*, 155, 161, 167, 174, 186; *ciliata*, var. *humifusa*, 161, 167; *groenlandica*, 156, 161, 166, 177, 179-181; *hirta*, 154; *macrophylla*, 63; *sajanensis*, 161, 167, 186; *verna*, 154, var. *propinqua*, 154, 161, 174.
 Arisaema triphyllum, 121.
 Arnica Chamissonis, 154; *chionopappa*, 164; *gaspensis*, 164; *mollis*, 154, 164, 191.
 Aromochelys, 199, 234; *odorata*, 199.
 Artemisia borealis, 155, 164, 167, 174, 186, var. *Wormskioldii*, 164, 167, 174; *canadensis*, 154, 164, 167.
 Arthur, J. C., *Peridermium pyriforme* and its probable alternate Host, 194.
 Arundinella, 50.
 Arundinelleae, 50.
 Asclepiadaceae, 52.
 Asclepiadeae, 37.
 Asclepias 37; *obtusifolia*, 14; *pulchra*, 122.
 Asphodeloideae, 37.
 Asphodelus, 37.
 Aspicarpa, 44.
 Aspidium, 83; *acrostichoides*, 83; *Boottii*, 83; *cristatum*, 83, var. *Clintonianum*, 83, 124, \times *marginale*, 84; *fragrans*, 154, 158; *marginale*, 83, var. *elegans*, 83; *noveboracense*, 83; *simulatum*, 74, 83; *spinulosum*, 84, 208, var. *concordianum*, 84; var. *dilatatum*, 84, forma **anadenium** 84, 218, var. *intermedium*, 84; *Thelypteris*, 83, forma *Pufferae*, 83.
 Asplenium, 82; *acrostichoides*, 12, 83; *Adiantum nigrum*, 175, subsp. *serpentinum*, 175; *adulterinum*, 175; **cyclosorum**, 155, 158; *ebeneum*, 82; *Filix-foemina*, 27, 83, var. *angustum*, 83; *platyneuron*, 82, var. *serratum*, 82; *thelypteroides*, 83; *Trichomanes*, 82; *viride* 154, 158, 166, 172, 175.
 Aster, 151, 157; *foliaceus*, 164, 191; *novibelgii*, 39; *puniceus*, var. *oligocephalus*, 164; *subulatus*, 151.
 Asterionella formosa, 137; *Ralfsii*, 137.
 Asterostemma, 52.
 Astragalus, 154; *alpinus*, 162; *Blakei*, 154, 155, 162, 167; *cariensis*, 50; *contortuplicatus*, 38; *elegans*, 162, 167, 172; *frigidus*, var. *americanus*, 162; *Jesupi*, 154; *rhizanthus*, 50.
 Astrostemma, 52.
 Athyrium cyclosorum, 158.
 Atriplex maritima, 144.
 Auliscus caelatus, 139; *Macraëanus*, 139; *pruinosis*, 139; *sculptus*, 139.
 Bacillaria paradoxa, 131, 136.
 Baethryon, 51.
 Baked-apple, 150.
 Balsam, Fir, 76.
 Baptisia tinctoria, 121.
 Bartlett, H. H., Flower Color of the American Diervillas, 147; The retrograde Color Varieties of Gratiola aurea, 122.
 Bartonina virginica, 122.
 Bartramia, 37.
 Basilima, 54.
 Basis of Nomenclature for Algae, 77.
 Behen, 55.
 Belamcanda, 53.
 Benthamia, 55.
 Berteroa, incana, 227.
 Betula alba, var. *minor*, 156, 160, var. *urticifolia*, 111; *glandulosa*, 160, 169, 174, 190; *incana*, 48; *lenta*, forma **laciniata**, 111; *pendula*, forma *dalecarlica*, 111; *pumila*, 189.
 Bibracteolata, 37.
 Biddulphia aurita, 138; *Baileyi*, 138; *levis*, 130, 139; *pulchella*, 138; *rhombus*, 138; *Tuomeyi*, 138.
 Bidens Beckii, 63; *comosa*, 14; *laevis*, 120.
 Biforia, 54.
 Bikukulla, 54.

- Black Oak, 61; Raspberry, 4; Spruce, 28, 208.
 Blackberry, Hog, 5.
 Blanchard, W. H., Connecticut Rubi, 4.
 Blephariglottis grandiflora, 154.
 Blessed Thistle, 28.
 Blue Fringed Gentian, 28.
 Bluet, 210.
 Boehmeria cylindrica, 121.
 Boletus vicesimus sextus, 51.
 Boston District, Reports on the Flora of the,— I, 81.
 Botanical and Bird Clubs, Thirteenth annual Field Meeting of the Vermont, 108; Society of Maine, Bulletin of the Josselyn, 196; Society of Maine, Meeting of the Josselyn, 107, 124.
 Botrychium, 85; lanceolatum, var. angustisegmentum, 85; matricariaefolium, 85; obliquum, 86, var. dissectum, 86, var. elongatum, 86; ramosum, 85; simplex, 85; ternatum, var. intermedium, 86; virginianum, 86.
 Bouchea, 38.
 Brainerd, E., Mendel's Law of Dominance in the Hybrids of Viola, 211; The older Types of North American Violets,— I, 93.
 Brassica Napus, 39.
 Braya humilis, 161.
 Broussonetia Boeckii, 135.
 Bromeliaceae, 37.
 Bromelineae, 37.
 Brooms, Witches', 75.
 Broussonetia tinctoria, 91.
 Brunella vulgaris, 122.
 Buda, 54.
 Bulletin of the Josselyn Botanical Society of Maine, 196.
 Bureau, 38.
 Bursa, 54.
 Calamagrostis, 157; purpurascens, 158; cinnoides, 121; hyperborea, 158; Langsdorfii, 158, 166; Pickeringii, 156, 158.
 Callithamnion, 91.
 Calluna, 47.
 Calochortus albus, 51; Nuttallii, 51.
 Calocyclus curtus, 232; minutus, 233.
 Caloneis Wardii, 131, 134.
 Calopogon, 53.
 Calypogeia, 56; arguta, 67, 69; bifurca, 67; fissa, 70; sphagnicola, 65, 66, 70, 71; suecica, 66, 70, 71; Sullivantii, 67–69, 73; tenuis, 69–71, 73; Trichomanis, 65–67, 69–71, var. tenuis, 69.
 Calystegia, 46, 55.
 Campanopsis, 48.
 Campanula, 157; aparinoides, 122; sect. Campanopsis, 48; uniflora, 163.
 Camptosorus, 83, 187; rhizophyllus, 83, 187.
 Campulosus, 53.
 Campylodiscus echineis, 128, 137; hibernicus, 137.
 Capellia, 47.
 Capnoides, 54.
 Capnorchis, 54.
 Capparis lasiantha, 45.
 Capriola, 53.
 Capsella, 54.
 Carbenia, 55.
 Cardamine, 47; bellidifolia, var. laxa, 161; glacialis, 48, var. subcarnosa, 48; hirsuta, var. subcarnosa, 48; propinqua, 48.
 Carduus, 48, 55; sect. Alfredia, 48.
 Carelia, 50, 55.
 Carex, 40, 120; alpina, 159; atrata, var. ovata, 159, 190; Backii, 159, 208; bicolor, 159; brunnescens, 63, 156, 159, 169; canescens, 159, 169, var. sublohiacea, 159; capillaris, 159, var. elongata, 159, 190; capitata, 155, 159; concinna, 159; deflexa, 159, 190; durifolia, 208; eburnea, 63, 159, 166, 172, 187; Grahami, 155, 160; Halleriana, 39; hypnoides, 166; katahdinensis, 155; lagopina, 159, 167; lenticularis, 159; limosa, 159, 189; Michauxiana, 156, 160; obtusata, 159; oligosperma, 160; pauciflora, 160, 189, 207; pauperula, 159, var. irrigua, 159, 189; rariflora, 159, 166, 180, 181; rigida, 159, var. Bigelowii, 156, 159, 169; saxatilis, 155, 160, var. miliaris, 160, 166; scripoides, 159, 169; stellutata, 159, 190; vaginata, 159, 189.
 Carica, 40.
 Carpenter, D. S., Thirteenth Annual Field Meeting of the Vermont Botanical and Bird Clubs, 108.
 Carphalea, 43.
 Carya, 53.
 Caryophyllaceae, 37.
 Cassiope hypnoides, 163; tetragona, 182.
 Castilleja acuminata, 154; pallida, var. septentrionalis, 24, 154, 163, 169, 190.

- Cat Spruce, 76.
 Catharinaea, 99; angustata, 64, 99;
 crispa, 74, in Maine, An Occurrence
 of, 74; Macmillani, 98, 99.
 Cathea, 53.
 Causes of Variation in Color of some
 red Algae, 90.
 Celtis occidentalis, 12.
 Centaurea Jacea, 46; vulgaris, 46.
 Centrospermae, 37.
 Cephalanthus occidentalis, 122.
 Cephalozia lunulaefolia, 66.
 Cerastium arvense, 161, 174, 175, var.
 oblongifolium, 175; beeringianum,
 161; cerastioides, 155, 161.
 Cerataulus levis, 139; polymorphus,
 139.
 Chaetomorpha, 199, 200; aerea, 199;
 Chelonum, 198; Henningsii, 199;
 Herbipolensis, 199.
 Chamaecistus, 54.
 Chamaecyparis on Long Island, New
 York, New Station for, 74; thyoides,
 74.
 Chamaedaphne calyculata, 163, 189.
 Chamaenerium angustifolium, 121.
 Chamberlain, E. B., Catharinaea Mac-
 millani, 98; Meeting of the Josselyn
 Botanical Society, 124; Thirteenth
 Annual Meeting of the Josselyn
 Botanical Society, 107.
 Cheiranthus tristis, 45.
 Chenopodiaceae, 143.
 Chenopodina linearis, 146; maritima,
 145, 146, var. vulgaris, 142, 145.
 Chenopodium maritimum, 142-146.
 Chesterville, Maine, Notes on Plants of,
 207.
 Chimaphila maculata, 122; umbellata,
 122.
 Chiogenes serpyllifolia, 14.
 Chlorophyceae, 78.
 Chrysemys, 199; marginata, 199.
 Chrysopsis, 55; falcata, 122.
 Cicuta bulbifera, 122; maculata, 122.
 Cincinnulus suecicus, 66; Trichomanis,
 var. sphagnicola, 65, var. suecicus,
 66.
 Circaea lutetiana, 39.
 Cirsium, 55; muticum, var. **monticola**,
 28, 164, 167, 191, Note on 28; super-
 canum \times rivulare, 42.
 Cisticapnos, 54.
 Cladophora **amphibia**, 200; expansa,
 197.
 Claytonia virginica, 75.
 Clematis, 151; verticillaris, 63; vir-
 giniana, 151.
 Clethra, 196; alnifolia, 122, 196, A
 pink-petaled Form of, 195.
 Closterium curtum, 232; Libellula,
 228; margaritaceum 229; poly-
 morphum, 231; Trabecula, 103;
 truncatum, 103; verrucosum, 105.
 Clubs, Thirteenth Annual Field Meet-
 ing of the Vermont Botanical and
 Bird, 108.
 Cnicus, 28, 55; benedictus, 28, 55;
 muticus, var. monticola, 28.
 Cocconeis dirupta, 136; scutellatum,
 136.
 Colinil, 54.
 Collaea, 38.
 Collins, F. S., The Basis of Nomen-
 clature for Algae, 77; Is Rhinanthus
 Crista-galli an introduced Plant? 26;
 Some new green Algae, 197.
 Color of the American Diervillas,
 Flower, 147.
 Comandra livida, 154, 156, 160, 189,
 190, 219.
 Compositae, 26, 37.
 Comptonia, 194, 195; peregrina, 194.
 Congress, On the Rules of Botanical
 Nomenclature adopted by the Vien-
 na, 29.
 Coniferae, 36.
 Conioselinum Gmelini, 224.
 Connecticut Diatoms with some Ac-
 count of their Distribution in certain
 Parts of the State, A partial List of,
 125; Noteworthy Plants of Salis-
 bury, 74; Plants, Notes on, 10;
 Rubi, 4.
 Contortae, 37.
 Convolvulus, 37, 46, 47; spithamaeus,
 124.
 Coptis trifolia, 121.
 Cornus Amomum, 122; canadensis, 63.
 Corydalis, 54.
 Corylus americana, 124.
 Coscinodiscus, 130; apiculatus, 139;
 asteromphalus, 139; concinnus, 139;
 excentricus, 139; gigas, 139; margi-
 natus, 139; nitidus, 139; oculus-
 iridis, 139; radiatus, 139; subtilis,
 139; symbolophorus, 139.
 Cosmariium cruciferum, 232; curtum,
 232.
 Cracca, 54.
 Crockett, A. L., An Occurrence of
 Catharinaea crispa in Maine, 74.
 Cronartium, 194; Comptoniae, 194;
 Quercus, 194.
 Crow-berry, 149, 177.
 Cruciferae, 37.

- Crucifers, 40.
 Cryptogramma densa, 158, 167; Stelleri, 154, 158, 166, 172, 173.
 Cryptotaenia, 54.
 Ctenium, 53.
 Cuphea, 63; viscosissima, 63.
 Curlew-berry, 149, 177.
 Currant, Red, 1.
 Cuscuta, 50; compacta, 11.
 Cushman, J. A., New England Species of Penium, 227; Primula farinosa, var. macropoda on the Maine Coast, 217; Synopsis of the New England species of Pleurotaenium, 101.
 Cyclotella antiqua, 125, 140; Kuetingiana, 140; striata, 140.
 Cymatopleura elliptica, 137; hibernica, 137; marina, 137; solea, 137.
 Cymbella, 131; affinis, 135; americana, 135; cistula, var. maculata, 135; cuspidata, 135; cymbiformis, var. parva, 135; Ehrenbergii, 135; gastroides, 135; heteropleura, 135.
 Cynanchum nivale, 43.
 Cynodon, 53.
 Cyripedium acaule, 121; Hookerae, 39; parviflorum, 160; spectabile, 124.
 Cystopteris, 84; bulbifera, 124; fragilis, 84, 158; montana, 158, 170.
 Cytisus, 51; biflorus, 51; Fontanesii, 51.
 Dactylon, 53.
 Dactylicapnos, 54.
 Danthonia intermedia, 28, 159, 167, 190.
 Dasys, 91; elegans, 90.
 Datisca hirta, 115.
 Dentaria, 47.
 Denticella mobiliensis, 138; rhombus, 138.
 Deringa, 54.
 Deschampsia atropurpurea, 24, 156, 158, 166, 190; caespitosa, var. alpina, 158, 167, 191.
 Desmids, 227.
 Desmodium, 54; canadense, 121; ciliare, 121; cuspidatum, 13; paniculatum, 121; rigidum, 121; sessilifolium, 13.
 Diandrae, 221.
 Dianthus Caryophyllus, 37; monspessulanus, 39.
 Diapensia, 154; lapponica, 163, 169.
 Diatoma anceps, 137; elongatum, var. tenue, 137; hiemale, 137; tenue, 137; vulgare, 137.
 Diatoms, 125-129, with some Account of their Distribution in certain Parts of the State, A partial List of Connecticut, 125.
 Dicentra, 54.
 Dickia crucigera, 135.
 Dicksonia, 27, 85; pilosiuscula, 85; punctilobula, 85.
 Dielytra, 54.
 Dicotyledoneae, 36.
 Dicranum Bergeri, 65.
 Dielytra, 54.
 Diervilla, 147; Lonicera, 147; rivularis, 147; sessilifolia, 147; splendens, 147; trifida, 147.
 Diervilla § Weigela, 147.
 Diervillas, Flower Color of the American, 147.
 Digitalis lutea \times purpurea, 41.
 Dimerogramma minus, 138; Surirella, 138.
 Diphyllum, 53.
 Diplogon, 55.
 Diplomorpha, 49.
 Diploneis didyma, var. obliqua, 134.
 Dissarrenum, 53.
 Ditylum Brightwellii, 130, 139; inaequale, 139; intricatum, 139; tetragonum, 139; trigonum, 139.
 Dobbin, F., Rediscovery of Podostemon ceratophyllus in Vermont, 220.
 Docidium Archeri, 104; clavatum, 104; constrictum, 105; coronatum, 102; Ehrenbergii, 103; indicum, 104; maximum, 104; minutum, 232; nodosum, 105; nodulosum, 102; Trabecula, 103; truncatum, 103; verrucosum, 105.
 Dondia, 54, 140; americana, 141, 144, 146; maritima, 141, 145.
 Draba arabisans, 161, var. orthocarpa, 161; aurea, 161; corymbosa, 161; incana, 154, 161, var. confusa, 161; megasperma, 161; pycnosperma, 161; stylaris, 154, 161, 166.
 Drosera intermedia, 121; linearis, 189; rotundifolia, 121.
 Droseras, 120.
 Dryas Drummondii, 151, 152, 162, 167, 179, 188, 191; integrifolia, 162, 167, 183.
 Dryopteris, 27; acrostichoides, 27; Filix-mas, 27, in Vermont, Further information regarding the Occurrence of, 27; fragrans, 154; Goldiana, 27; marginalis, 27; noveboracensis, 27, 121; simulata, 121; spinulosa, 27, 121; Thelypteris, 121.

- Dulichium arundinaceum*, 121.
 Dunham, E. M., *Polytrichum gracile* Dicks. in Maine, 64.
 Durvillea, 38, 52.
 Dwarf Mistletoe, 75, on the south-eastern Coast of Maine, 208.
 Eames, A. J., Preliminary Lists of New England Plants,—XX, *Sparganiaceae*, 86.
 Eames, E. H., A new Variety of *Scirpus Olneyi*, 220.
 Eaton, L. O., Notes on Plants of Chesterville, Maine, 207.
 Eatonia, 11; Dudleyi, 11.
 Echinocystis, 55.
 Echinospermum Lappula, 14.
 Egeria, 44.
 Elaeagnus argentea, 162, 179.
 Eleocharis olivacea, 74.
 Ellisia, 55.
 Elymus mollis, 218.
 Embelia Sarasinorum, 39.
 Empetrum, 178, 193; nigrum, 149–152, 156, 162, 169, 170, 174, 177, 178, 180–182, 189, 218, var. *andinum*, 162, 219.
 Enantioblastae, 37.
 Encyonema caespitosum, 135; prostratum, 135.
 Englera, 38.
 Englerastrum, 38.
 Englerella, 38.
 Epilobium, 157; alpinum, 154, 162, 191; anagallidifolium, 162; strictum, 63.
 Epiphegus, 55.
 Epithemia argus, 138; gibba, 138, var. *ventricosa*, 138; musculus, 138; turgida, 138; zebra, 138.
 Eragrostis minor, 12.
 Erica, 47; vulgaris, 47.
 Erigeron acris, 164, 189, var. *debilis*, 164, var. *droebachensis*, 164; *hyssopifolius*, 154, 164, 167, 172, 191.
 Eriocaulon septangulare, 121.
 Eriophorum callitrix, 159, 180, 181, 189, 218; Chamissonis, 159, 224, var. *albidum*, 159; *virginicum*, 121.
 Erodium cicutarium, 124.
 Erophila, 54.
 Erysimum hieraciifolium, subsp. *pannonicum*, var. *longisiliquum*, 41, subsp. *strictum*, var. *longisiliquum*, 41.
 Erythrina, 43; micropterix, 43; Poepigiana, 43.
 Euastrum oblongum, 79.
 Euhelianthemum, 46.
 Euhermannia, 37.
 Eunotia Diadema, 138; elongata, 138; flexuosa, 138; gracilis, 138; lunaris, 138; major, 138; praerupta, 138, var. *bidens* 138; *robusta*, 138.
 Eunotogramma laeve, 138.
 Eupatorium, 49.
 Euphorbia maculata, 121.
 Euphrasia borealis, 163; latifolia, 163, 190; Oakesii, 163; Williamsii, 155, 163.
 Eupodiscus, 130; argus, 139; Rodgersii, 139.
 Eusideroxylon, 38.
 Evans, A. W., Notes on New England Hepaticae,—V, 56, 65.
 Fagopyrum, 54.
 Fagus alba, 114; americana, 112–114, var. *latifolia*, 113; *atropunicea*, 112, 113; *grandifolia*, 112, 113, var. *caroliniana*, 114, forma *mollis*, 114, 115; *grandifolia*, forma *pubescens*, 111, 114, 115; *ferruginea*, 112–115, var. *caroliniana*, 113, 114, var. *latifolia*, 113, 114; *heterophylla*, 114; *latifolia*, 112, 113; *nigra*, 114; *rotundifolia*, 114; *sylvatica*, 113, 114, var. *americana*, 113, var. *americana latifolia*, 113, var. *atropunicea*, 113; *sylvestris*, 113, 114.
 Falcata, 54.
 Fedia, 55.
 Fern, Holly, 27.
 Fernald, M. L., The alpine *Rhinanthus* of Quebec and New Hampshire, 23; The Genus *Suaeda* in northeastern America, 140; Note on *Cirsium muticum*, var. *monticola*, 28; Preliminary Lists of New England Plants,—XX, *Sparganiaceae*, 86; *Ribes vulgare* and its indigenous Representatives in North America, 1; *Salicornia europaea* and its Representatives in eastern America, 204; The Soil Preference of certain alpine and subalpine Plants, 149; Some new Willows of eastern America, 221; *Streptopus oreopolus* a possible Hybrid, 106; The Variations of *Primula farinosa* in northeastern America, 15.
 Festuca, 174; altaica, 155, 159, 167, 174, 188, 224; ovina, var. *brevifolia*, 159; rubra, var. *prolifera*, 159.
 Fibichia, 53.
 Ficus indica, 39.
 Fimbriati, 37.

- Fimbristylis*, 53; *capillaris*, 121.
Fir Balsam, 76.
 Fletcher, E. F., *Alchemilla pratensis*, found at Westford, Massachusetts, 92.
 Flora of the Boston District, Reports on the,—I, 81; of the Great Swamp of Rhode Island, 117.
 Flower Color of the American Dier-villas, 147.
 Flowering Raspberry, 5.
 Forbes, F. F., Reports on the Flora of the Boston District,—I, 81.
 Form of *Clethra alnifolia*, A pink-petaled, 195.
Fragillaria capucina, 137; *construens*, 137; *Harrisonii*, 131, 137; *virescens*, 137.
Fraxinaster, 37.
 Fringed Gentian, Blue, 28.
Fritillaria alba, 51.
Frullania, 72; *Asagrayana*, 72, 73; *Brittoniae* 73; *Tamarisci*, 72, 73.
Frustulia Lewisiana, 135; *rhomboides*, 135, var. *saxonica*, 135; *viridula*, 135.
Fucus, 78.
Fumana, 46.
Fumaria Gussonei, 39.
Fungi, 36.
Furera, 55.
 Further Information regarding the Occurrence of *Dryopteris Filix-mas* in Vermont, 27.
Galium asprellum, 122; *boreale*, 14; *kamtschaticum*, 163.
Galionella nummuloides, 140.
Gansblum, 54.
Gaylussacia, 54; *dumosa*, 119.
Gemmingia, 53.
Genista Boissieri, 47; *horrida*, 47; *Webbei*, 47.
 Gentian, Blue Fringed, 28.
Gentiana acuta, 154; *Amarella*, var. *acuta*, 154, 163, 167.
 Genus *Suaeda* in northeastern America, 140.
Geocalyx graveolens, 73.
Geranium Robertianum, 39.
Gerardia, 38; *paupercula*, 122; *purpurea*, 122.
Gesnera Donklarii, 45.
Geum Peckii, 154, 155, 162; *radiatum*, 154.
Glazioua, 38.
Globularia cordifolia, 45.
Gloriosa, 37.
Glumiflorae, 37.
Glyceria, 53; *canadensis*, 121; *ner-vata*, var. *stricta*, 208; *obtusata*, 121.
Gnaphalium norvegicum, 24, 164, 191; *supinum*, 154, 164; *uliginosum*, 154.
Gomphonema acuminatum, 136; *augur*, 136; *capitatum*, 136; *constrictum*, 136; *cristatum*, 136; *geminatum*, 136.
Goodyera pubescens, 121.
Graderia, 38.
Gramineae, 37, 50.
Grammatophora oceanica, var. *macilenta*, 138.
Gratiola at Westfield, a clerical Error, Record of Color Varieties of, 195; *aurea*, 122, 123, 195, forma *helveola*, 123, forma *leucantha*, 123, The retro-grade Color Varieties of, 122; *Drummondii* 123; *ebracteata*, 123; *floribunda*, 123; *gracilis*, 123; *macrantha*, 123; *pusilla*, 123; *ramosa*, 123; *sphaerocarpa*, 123; *Torreyi*, 123; *virginiana*, 123; *virescens*, 123.
Gratiolaria, 123.
Grimmaldia fragrans, 73.
Guttiferae, 37.
Gymnocimum, 37.
Gymnospermae, 36.
Gypsophila, 48, sect. *Vaccaria*, 48.
Gyrosigma Temperi, 135.
Gyrostachis, 53.
Gyrotheca, 53.
Habenaria blephatiglottis, 119, 121, 124; *ciliaris*, 119; *clavellata*, 121; *dilatata*, 160, 189, 190; *fimbriata*, 154; *hyperborea*, 124; *macrophylla*, 124; *orbiculata*, 74; *psycodes*, 121.
Halenia, 55.
 Handy, L. H., A pink-petaled form of *Clethra alnifolia*, 195.
Hantzschia amphioxys, 136; *segmentalis*, 136.
Haplopappus, 55.
 Harger, E. B., An interesting Locality, 62.
 Harrison, A. K., Reports on the Flora of the Boston District,—I, 81.
Hedypnois, 55.
Hedysarum, 37, 154, 193; *americanum*, 154; *boreale*, 154, 162, 167, 172, 179; *Mackenzii*, 179.
Helianthemum, 46; *italicum*, var. *micranthum*, 48; *penicillatum*, 48, var. *micranthum*, 48.
Helxine, 54.

- Hemiaulus affinis*, 138; *tubulosus*, 138.
Hemigenia, sect. *Hemigenia*, 47.
Hepaticae, 63, Notes on New England, — V, 56, 65.
Heritiera, 53.
Herniaria diandra, 40; *hirsuta*, var. *diandra*, 40.
Heteranthera, 53; *graminea*, 63.
Heterodraba, 37.
Hicoria, 53.
Hicorius, 53.
Hieracium Flahaultianum, 43; *floribundum*, 63; *Gronovii*, 122; *scabrum*, 122.
Hierochloa, 53; *alpina*, 156, 158, 166; *borealis*, 11.
Hog Blackberry, 5.
Holly Fern, 27.
Homalocenchrus, 53.
Hoorebeckia, 55.
Host, *Peridermium pyriforme* and its probable alternate, 194.
Hottonia inflata, 14, 63.
Houstonia caerulea, 209, 210, Alpine Variety of, 209, forma *albiflora*, 210, var. **Faxonorum**, 210; *serpyllifolia*, 210.
Hyalodiscus stelliger, 140; *subtilis*, 140.
Hybrid, *Streptopus oreopolus* a possible, 106.
Hybrids of *Viola*, Mendel's Law of Dominance, in the 211.
Hydrocotyle umbellata, 13.
Hydrophyllum virginicum, 75.
Hypericum boreale, 121; *canadense*, 121; *gentianoides*, 121; *maculatum*, 121; *virginicum*, 121.
Hypoxis erecta, 121.

Ibidium, 53.
Ilex, 151; *monticola*, 151; *opaca*, 13.
Illicioides, 54.
Ilysanthes attenuata, 122; *gratioloides*, 122.
Impatiens, 37.
Interesting Locality, 62.
International Rules for Botanical Nomenclature chiefly of Vascular Plants, 33.
Ioxylon pomiferum, 91.
Iria, 52, 53.
Iriha, 53.
Iris, 52; *setosa*, 219; *versicolor*, 219.
Isthmia nervosa, 131, 138.

Josselyn Botanical Society, Bulletin of the, 196, Meeting of the, 107, 124.
Joxylon, 54.

Juncoides, 3.
Juncus alpinus, 160; *brevicaudatus*, 121; *canadensis*, 121; *castaneus*, 24, 160, 190; *filiformis*, 156, 160, 189; *marginatus*, 121; *militaris*, 119; *pelocarpus*, 121; *tenuis*, var. *Williamsii* 121; *trifidus*, 156, 160, 169.
Juniperus communis, var. *montana*, 158; *horizontalis*, 202, forma **lobata**, 202.
Jungermannia dovrensis, 58; *haemato-sticta*, 57, 58; *longidens*, 59; *porphyroleuca*, var. *attenuata*, 59; *scalaris*, β minor, 57, β *repanda*, 57; *Silvrettae*, 57.

Kalmia, 187; *angustifolia*, 163, 169, 189; *glauca*, 182; *latifolia*, 122, 187; *polifolia*, 163, 169, 182, 189.
Kantia, 56; *sphagnicola*, 65; *suecica*, 66; *Sullivantii*, 67, 73; *Trichomanis*, 66, var. *tenuis*, 69.
Kernera, 38.
Kneiffia pumila, 122.
Knight, O. W., Three Plants from Maine, 202.
Knowlton, C. H., Newly observed Stations for Massachusetts Plants, 11; Noteworthy Plants collected at Roque Bluffs, Maine, in 1907, 218; Reports on the Flora of the Boston District, — I, 81.
Koellia, 55; *virginiana*, 122.
Krigia, 55.

Labiatae, 37, 50.
Lachnanthes, 53; *capitata*, 119.
Laciniaria, 55.
Lamson-Scribner, see Scribner, F. Lamson.
Lapeyrousea, 38.
Laplacea, 49.
Laportea, 54.
Lappula deflexa, 163.
Larix laricina, 158, 169.
Lauraceae, 38.
Lawrence, Massachusetts, *Acanthospermum australe* at, 26.
Ledum groenlandicum, 156, 162, 169, 170, 174, 189; *palustre*, 182.
Leersia 53.
Leguminosae, 37.
Lemairea, 50.
Leontodon autumnale, 122.
Lepargyrea, 54.
Lepidium spathulatum, 40.
Leptamnium, 55.
Leptorkis, 53.
Leptostachys, 51.

- Leptothrix*, 131.
Lerchea, 54.
Lespedeza capitata, 121; *frutescens*, 120, 121.
Leucothoe racemosa, 14.
Liatris, 55.
Libellus rhombicus, 134.
Lichenes, 36.
Licmophora flabellata, 138; *Juergensii*, 138; *tincta*, 138.
Lignum, 51.
Linaria genistaeifolia, 14; *Linaria*, 51.
Linum usitatissimum, 119.
Liparis, 53.
Liquidambar, 37.
 List of Connecticut Diatoms with some Account of their Distribution in certain Parts of the State, 125.
Listera, 53.
 Lists of New England Plants, Preliminary,—XX, *Sparganiaceae*, 86.
Lithodesmium undulatum, 139.
Lobelia cardinalis, 120, 122; *Dortmanna*, 119; *inflata*, 122; *Kalmii*, 164, 189, 190.
Loiseleuria, 54; *procumbens*, 154, 162, 169, 177.
 Long Island, New York, New Stations for *Chamaecyparis* on, 74.
Lonicera caerulea, var. *villosa*, 163, 190; *oblongifolia*, 189.
Lophozia, 56; *alpestris*, 59; *confertifolia*, 59; *excisa*, 73; *longidens*, 59, 60; *porphyroleuca*, 66, 73; *ventricosa*, 59; *Wenzelii*, 59.
Lotus siliquosus, 48.
Lupinus perennis, 124.
Luzula, 53; *confusa*, 160; *parviflora*, 156, 160, 169; *spicata*, 160; var. *tenella*, 160, 167.
Lychnis alba, 121; *alpina*, 160, 167, 174, 186, 191.
Lycopodium alpinum, 158; *annotinum*, 63, 74, var. *pungens*, 158; *complanatum*, 121; *lucidulum*, 121; *obscurum*, 121; *Selago*, var. *appressum*, 156, 158, 169, var. *patens*, 158; *sitchense*, 158.
Lycopus americanus, 122; *virginicus*, 120, 122.
Lygodium, 85; *palmatum*, 85.
Lyngbya aestuarii, 197.
Lysias, 53.
Lysigonium moniliforme, 139; *varians*, 139.
Lysimachia Hemsleyana, 39; *Hemsleyi*, 39; *producta*, 14; *quadrifolia*, 122; *thrysiflora*, 207.
Lythrum alatum, 75; *Hyssopifolia*, 39; *intermedium*, 48; *Salicaria*, 49, var. *gracilius*, 49; var. *intermedium*, 49.
Maclura, 54, 91; *aurantiaca*, 91; ***pomifera***, 91, 148.
Macrocalyx, 55.
Madia, 37.
Madiinae, 37.
Magnolia foetida, 48; *grandiflora*, 48; *virginiana*, var. *foetida*, 48.
Magnusia, 38.
 Maine, Bulletin of the Josselyn Botanical Society of, 196; Coast, *Primula farinosa*, var. *macropoda* on the, 217; The dwarf Mistletoe on the south-eastern Coast of, 208; in 1907, Noteworthy Plants collected at Roque Bluffs, 218; Notes on Plants of Chesterville, 207; An Occurrence of *Catharinæa crispa* in, 74; *Polytrichum gracile* Dicks. in, 64; Three Plants from, 202.
Majanthemum, 53.
Malva Tournefortiana, 39.
Malvaceae, 37.
Malvineae, 37.
Manihot, 37.
Mariana, 55.
Marsupella, 57; *erythrorhiza*, 57; *media*, 57; *Silvrettae*, 57; ***Sullivantii***, 57.
Marsypocarpus, 54.
Martia, 38.
Martinella apiculata, 71.
Martuisia, 38.
 Massachusetts, *Acanthospermum australe* at Lawrence, 26; *Alchemilla pratensis* found at Westford, 92; *Notothyas orbicularis* in, 219; Plants, Newly observed Stations for, 11.
Mastogloia gibbosa, 135; *undulata*, 135.
Matricaria discoidea, 14.
Matthiola, 45; *tristis*, 45.
Medeola virginiana, 121.
Medicago denticulata, 124; *orbicularis*, 45; *polymorpha*, var. *orbicularis*, 45; *sativa*, 121.
 Meeting of the Josselyn Botanical Society, 107, 124; of the Vermont Botanical and Bird Clubs, 108.
Meibomia, 54.
Melinis, 50.
Melosira Borreri, 128, 139; *coronata*, 140; *nummuloides*, 140; *octogona*, 140; *sculpta*, 140; *undulata*, 140; *varians*, 139.

- Mendel's Law of Dominance in the Hybrids of Viola, 211.
- Mentha, 49; *arvensis*, 122; *bracteolata*, 44; *foliicola*, 44; *longifolia* × *rotundifolia*, 42; *spicata*, 48, var. *viridis*, 48; *villosa*, β *Lamarekii*, 42; *viridis*, 48.
- Menyanthes trifoliata, 157, 163, 189, 190.
- Meridion circulare, 137; intermedium, 137.
- Mertensia, 55.
- Mesophylla minor, 58.
- Metastelma, 37.
- Metastelmataceae, 37.
- Metzgeria, 68.
- Micranthella, 55.
- Micromelilotus, 37.
- Micropterix Poeppigiana, 43.
- Microspermae, 37.
- Microspora, 78.
- Microstylis monophyllos, 160.
- Mikania, 55.
- Minthe, 49.
- Mistletoe, Dwarf, 75; on the southeastern Coast of Maine, The dwarf, 208.
- Mitrophora, 55.
- Monochaete, 52.
- Monochaetum, 52.
- Monocotyledoneae, 36.
- Montia fontana, 219.
- Moore, A. H., Alpine Variety of Houstonia caerulea, 209.
- Mormon Weed, 26.
- Mosses, 98.
- Mount Desert, Arceuthobium pusillum at, 75.
- Muhlenbergia, 17, 23; *ambigua*, 20; *diffusa*, 17; *foliosa*, 19-21, subsp. *ambigua*, 20, 21, subsp. *setiglumis*, 20; *glabrifloris*, 22; *glomerata*, 22, var. *ramosa*, 22; *gracilis*, 20; *mexicana*, 18, 19, 21, 23, subsp. *commutata*, 18, 21, var. *filiformis*, 19; Notes on, 17; *palustris*, 17; *polystachya*, 18; *racemosa*, 20, 22, var. *ramosa*, 22, subsp. *violacea*, 22; Schreberi, 17, 22, subsp. *curtisetosa*, 17, subsp. *palustris*, 17; *sobolifera*, 17, 18, 22, subsp. *setigera*, 18; *sylvatica*, 18, 20, 21, 23, var. *gracilis*, 20, var. *setiglumis*, 20; *tenuiflora*, 18, 21, 22, subsp. *variabilis*, 18; *umbrosa*, 20-22, subsp. *attenuata*, 21; Willdenowii, 18.
- Mulberry, 5.
- Murdoch, J. Jr., Arceuthobium in the Rangeley Region, 28.
- Myogalum Boucheanum, 43.
- Myosotis, 45, 46.
- Myrica, 50; *asplenifolia*, 121; *cerifera*, 194.
- Nabalus Boottii, 154.
- Nardia Geoscyphus, 57, 58; *haematosticta*, 57, 58; *insecta*, 58, 59; *minor*, 58; *repanda*, 57; *scalaris*, 58; *Silvrettae*, 58.
- Nasturtium sylvestre, 12.
- Navicula, 131; *advena*, 132; *americana*, 133; *amphigomphus*, 133; *amphipleuroides*, 133; *amphirhynchus*, 126, 133; *approximata*, 132; *arabica*, 133; *aspera*, 133; *bacillum*, 133; *Bartleyana*, 133; *Boeckii*, 135; *bombus*, 132; *borealis*, 132; *brasiliensis*, 132; *Breissonii*, 132; *californica*, var. *campeachiana*, 133; *cancelata*, 132; *cardinalis*, 132; *caribaea*, 132; *circumsecta*, 133; *clavata*, 132; *columnaris*, 133; *crabro*, 132; *crassinervia*, 135; *crucicola*, 133; *cuspidata*, 133; *dactylus*, 132; *delawarensis*, 133; *didyma*, 132; *digitoradiata*, 132; *dilatata*, 133; *diplois*, var. *obliquus*, 133; *directa*, 132; *distans*, 132; *divergens*, 132; *elegans*, 133; *elliptica*, 126, 132, var. *oblongella*, 132; *esox*, 133; *firma*, 133; *Fischeri*, 133; *forcipata*, 132; *formosa*, 133; *fortis*, 132; *fusca*, 132; *gibba*, 132; *gigas*, 132; *Hennedyi*, 132; *hibernica*, 132; *Hitchcockii*, 133; *humerosa*, 133; *interposita*, 133; *interrupta*, 132; *iridis*, 133, var. *amphigomphus*, 133, var. *amphirhynchus*, 133, var. *producta*, 133; *irrorata*, 132; *kamorthensis*, 133; *lata*, 128, 132; *latissima*, 133; *Legumen*, 132; *Lewisiana*, 130, 135; *liber*, 133; *limosa*, 133; *longa*, 132; *lyra*, 130, 132; *maculata*, 129, 133; *major*, 132; *marina*, 133; *nobilis*, 131, var. *dactylus*, 132; *oblongella*, 132; *palpebralis*, 133; *parallela*, 133; *peregrina*, 132; *peripunctata*, 131, 133; *permagna*, 129, 130, 133; *polyonca*, 132; *polysticta*, 132; *Powellii*, 133; *praetexta*, 132; *producta*, 133; *pulsilla*, 133; *pygmaea*, 132; *rhombica*, 134; *rhomboides*, 135; *rhyncocephala*, 132; *Semen*, 128, 132; *serians*, 133; *Sillimanorum*, 133;

- Smithii, 132; sphaerophora, 133; Tabellaria, 132; theta, 134; trinodis, 134; tubulosa, 134; tumescens, 133; tuscula, 133; viridis, 132; yarrensis, 132; zostereti, 132.
- Nazia, 53.
- Neckeria, 54.
- Needhamia, 54.
- Nemopanthus, 54.
- Neoplatago, 37.
- Nepeta Sieheana, 43.
- Nephrodium spinulosum, var. fructuosum, 84; Thelypteris, forma Pufferae, 83.
- Neves-Armondia, 51.
- New England Hepaticae, Notes on,— V, 56, 65; Plants, Preliminary Lists of,— XX, Sparganiaceae, 86; Species of Penium, 227; Species of Pleurotaenium, Synopsis of the, 101; Trees, Some new or little known Forms of, 109.
- New Hampshire, The alpine Rhinanthus of Quebec and, 23.
- New York, New Stations for Chamaecyparis on Long Island, 74.
- Newly observed Stations for Massachusetts Plants, 11.
- Nicandra, 55.
- Nichols, J. T., New Stations for Chamaecyparis on Long Island, New York, 74.
- Nigritella, 48; angustifolia, 48; nigra, 48.
- Nitzschia, 131; acuminata, 136; angularis, 136; circumsuta, 136; Closterium, 136; curvirostris, var. Closterium, 136; curvula, 131, 136; fasciculata, 136; granulata, 136; linearis, var. tenuis, 136; Lorenziana, 136; marginulata, 136; obtusa, 136; plana, 136; scalaris 130, 136; Shafferi, 131, 136; sigma, 136; sigmoidea, 136; tenuis, 136; tryblionella, 136, var. maxima, 136.
- Nomenclature adopted by the Vienna Congress, On the Rules of Botanical, 29; chiefly of Vascular Plants, International Rules for botanical, 33; for Algae, The Basis of, 77.
- North America, Ribes vulgare and its indigenous Representatives in eastern, 1.
- North American Violets, The older Types of,— I, 93.
- Norton, A. H., The dwarf Mistletoe on the southeastern Coast of Maine, 208.
- Note on Cirsium muticum, var. monticola, 28.
- Notes on Connecticut Plants, 10; on Muhlenbergia, 17; on New England Hepaticae,— V, 56, 65; on Plants of Chesterville, Maine, 207.
- Noteworthy Plants collected at Roque Bluffs, Maine, in 1907, 218; Plants of Salisbury, Connecticut, 74.
- Notothylas, 219; orbicularis, 219, in Massachusetts, 219.
- Nuphar advena, 121.
- Nymphaea odorata, 121.
- Oak, 60; Black, 61; Scrub, 60; White, 61.
- Occurrence of Catharinaea crispa in Maine, 74.
- Ocimum, 44.
- Odontella aurita, 138; turgida, 138.
- Odontochisma denudatum, 73.
- Odontidium Harrisonii, 137; hiemale, 137; mutabile, 137.
- Oedogonium, 78.
- Oenothera biennis, 122.
- Older Types of North American Violets,— I, 93.
- Omphalodes Luciliae, 39.
- Onobrychus eubrychidea, 43.
- Onoclea, 85; sensibilis, 85; Struthiopteris, 85.
- Ophioglossaceae, 85.
- Ophioglossum, 85; vulgatum, 85.
- Opulaster, 54.
- Orange, Osage, 91, 148.
- Orchidaceae, 52.
- Ornithogalum, 43; Boucheanum, 43; undulatum, 43.
- Orobanche artemisiae, 49; artemisiophyta, 49; Columbriacae, 49; columbarihaerens, 49; Rapum, 49; sarothamnophyta, 49.
- Orontium aquaticum, 119.
- Osage Orange, 91, 148; The Scientific Name of the, 91.
- Osmunda, 85; cinnamomea, 85, var. frondosa, 85; Claytoniana, 85; regalis, 85.
- Oxalis Acetosella, 207, var. subpurpurea, 207; corniculata, 121.
- Oxyria digyna, 154, 160.
- Oxytropis, 54; campestris, var. johannensis, 162.
- Pachycladae, 37.
- Palmae, 37.
- Palmelloccoccus, 197; miniatus, 198.

- Panax nossibiensis*, 43.
Panicularia, 53.
Panicum tennesseense, 208; *Weneri*, 208.
Papaver Rhoeas, 39.
Paralia sulcata, 140.
Parietales, 37.
Parnassia Kotzebuei, 162, 167; *parviflora*, 162, 189.
 Pease, A. S., *Alpine Variety of Hous-tonia caerulea*, 209.
Pedicularis flammea, 163.
Pelargonium zonale, 41.
Pellaea atropurpurea, 187; *gracilis*, 74, 154.
Penium, 227; *annulare* 228, 233, var. *obesum*, 233; *Clevei*, 228, 230, var. *crassum*, 230; *closterioides*, 228, forma *interrupta*, 229; *cruciferum*, 228, 232; *curtum*, 228, 232; *cuticulare*, 228, 230; *Libellula*, 228, var. *intermedium*, 229; var. *interruptum*, 229; *margaritaceum*, 228-230, var. *punctatum*, 231; *minutum*, 228, 232, 233, var. *elongatum*, 233; *Navicula*, 228, 229; *New England Species of*, 227; *phymatosporum*, 228, 231; *polymorphum*, 228, 231; *spirostriolatum*, 228, 231, var. *apiculatum*, 231.
Pentagonia, 55.
Peponia, 52.
Peponium, 52.
Peridermium, 194, 195; *Cerebrum*, 194; *pyriforme*, 194, and its probable alternate Host, 194.
Periptera tetracladia, 139.
Petasites trigonophylla, 155, 164, 191; *vitifolia*, 155, 164.
Peyrousea, 38.
Phaeocephalum, 51.
Phaseolus perennis, 10.
Phegopteris, 82; *alpestris*, 155, 158; *Dryopteris*, 63, 82; *hexagonoptera*, 82, 208; *polypodioides*, 82; *Robertiana*, 158.
 Phelps, O. P., *Noteworthy Plants of Salisbury, Connecticut*, 74.
Phleum alpinum, 24, 154, 158, 190.
Phragmopedilum caudatum, 50.
Phrynium, 53.
Phyllanthaeae, 37.
Phyllanthus, 37, 45.
Phyllocoe caerulea, 163, 169, 190.
Physaloides, 55.
Physocarpus, 54.
Physospermum, 42.
Phyteuma Halleri, 39.
Picea, *Abies*; forma *virgata*, 110; *alba*, 75; *brevifolia*, 109, var. *semi-prostrata*, 110; *canadensis*, 158, 169; *excelsa*, var. *virgata*, 110; *mariana*, 110, 158, 169, 174, var. *brevifolia*, 109, 110; *nigra*, 75, 218, var. *brevifolia*, 109, var. *virgata*, 110, *rubens*, 110; *rubra*, 110, forma *virgata*, 110, 111.
Pilea, 54.
Pinaceae, 157.
Pinguicula, 153; *vulgaris*, 154, 163, 167, 172, 183, 190.
Pink-petaled Form of Cethra alnifolia, 195.
Pinnularia, 131.
Pinus rigida, 194, 195; *virginiana*, 195.
Plagiogramma Gregorianum, 138; *staurophorum*, 138; *validum*, 138.
Plagiotropis vitrea, 135.
Plant, Is Rhinanthus Crista-galli an introduced, 26.
Plantago aristata, 122.
Plants collected at Roque Bluffs, Maine, in 1907, 218; *from Maine, Three*, 202; *International Rules for Botanical Nomenclature chiefly of Vascular*, 33; *New Stations for two Vermont*, 227; *Newly observed Stations for Massachusetts*, 11; *Notes on Connecticut*, 10; *of Chesterville, Maine, Notes on*, 207; *of Salisbury, Connecticut*, 74; *Preliminary Lists of New England*,—XX, *Sparganiaceae*, 86; *Soil Preferences of certain alpine and subalpine*, 149.
Platanthera, 53.
Plelostylae, 37.
Pleuripetalum, 52.
Pleurococcus marinus, 197, 198; *miniatus*, 198.
Pleurolobus, 54.
Pleuripetalum, 52.
Pleurosigma, 128-130; *acuminatum*, 134; *affine*, 130, 134; *americanum*, 129, 134; *angulatum*, 130, 134, var. *aestuarii*, 134; *attenuatum*, 134; *balticum*, 128-130, 134; *Brebissonii*, 134; *decorum*, 129; 134; *elongatum*, 129, 134, var. *gracile*, 134; *eximeum*, 134; *fasciola*, 134; *formosum*, 134; *hypocampus*, 134; *intermedium*, 130, 134; *latum*, 134; *litorale*, 134; *naviculaceum*, 134; *nebecula*, 134; *paradoxum*, 129, 134; *scalpoides*, 134; *simile*, 134; *Spen-cerii*, 134, var. *curvulum*, 134; *strigile*, 129, 134, 234; *strigosum*, 134;

- subsalinum 135; Terryanum, 129, 134, Wansbeckii, 134.
 Pleurostauron acutum, 134.
 Pleurotaenium, 101; acutum, 126; constrictum, 101, 102, 105, 106; coronatum, 102, 106, var. fluctuat-um, 102, var. nodulosum, 102; Ehrenbergii, 102, 103, 106, var. elongatum, 103, var. undulatum, 103; indicum, 104; maximum, 102, 104; nodosum, 101, 102, 105, 106; rectum, 104; subgeorgicum, 102, 104, 106; Synopsis of the New England Species of, 101; Trabecula, 102, 103, 106, forma clavatum, 104, forma granulatatum, 104, var. rectum, 104; truncatum, 102, 103, 106; verrucosum, 101, 102, 105, 106.
 Pneumaria, 55.
 Poa, 157; alpina, 159; laxa, 156, 159, 166; Sandbergii, 159.
 Podocystis adriatica, 137; americana, 137.
 Podosira dubia, 140.
 Podostemon ceratophyllus, 220, in Vermont, Rediscovery of, 220.
 Polanisia trachysperma, 75.
 Polemonium Van Bruntiae, 75.
 Polygala Nuttallii, 121; polygama, 121.
 Polygonaceae, 37.
 Polygonales, 37.
 Polygonastrum, 53.
 Polygonum acre, 119; arifolium, 121; Carey, 119; dumetorum, var. scandens, 119; hydropiperoides, 119; pennsylvanicum, 121; Persicaria, 121; punctatum, 121; sagittatum, 121; viviparum, 154, 156.
 Polymnia, 62, 63; canadensis, 62.
 Polypodiaceae, 82.
 Polypodium, 82; vulgare, 82.
 Polystichum, 83, 174; acrostichoides, 83, var. incanum, 83, Schweinitzii, 83; Braunii, 154; Lonchitis, 158, 190; scopulinum, 158, 167, 174, 188.
 Polytrichum, 64; gracile, 64, in Maine, 64.
 Pongelion, 54.
 Pontederia cordata, 121, var. lancifolia, 121.
 Portulaca, 50.
 Portulacaceae, 50.
 Potamogeton lucens, var. connecticu-tensis, 74; praelongus, 63.
 Potentilla fruticosa, 12; nivea, 162; palustris, 162, 189; Robbinsiana, 162; tridentata, 156, 162, 169.
 Preferences of certain alpine and sub-alpine Plants, Soil, 149.
 Preliminary Lists of New England Plants,—XX, Sparganiaceae, 86.
 Prenanthes Boottii, 154, 156, 164, 166; trifoliolata, var. nana, 164, 169, 171, 191.
 Primula americana, 16; denticulata, 47; erosa, 47; farinosa, 15, in north-eastern America, Variations of, 15, subsp. eufarinosa, var. genuina, 15, var. americana; 15, var. **incana**, 16, var. **macropoda**, 16, 163, 167, 217, on the Maine Coast, 217; incana, 16; mistassinica, 163, 167, 172.
 Primularia cashmiriana, 47.
 Protococcus miniatus, 198.
 Pseudingia, 37.
 Pseudoauliscus radiatus, 139.
 Pseudoeunotia flexuosa, 138, bicap-itata, 138; lunaris, 138.
 Pseudofumaria, 54.
 Psilosanthus, 55.
 Pteridophyta, 36, 152, 157, 187.
 Pteris, 82; aquilina, 82.
 Pteropsiella, 68.
 Purple Raspberry, 5.
 Pycnanthemum, 55.
 Pyrola grandiflora, 24, 162, 190; mi-nor, 154.
 Pyrus, 202; americana, 63, 203; **americana** \times **arbutifolia**, 202.
 Pyxilla baltica, 139.
 Quebec and New Hampshire, The Al-pine Rhinanthus of, 23.
 Quercus ilicifolia, 60, 61; prinoides, 60, 61, var. **rufescens**, 61; Prinus, 12.
 Quisqualis, 51.
 Racomitrum lanuginosum, 173.
 Radix, 51.
 Ramondia, 38.
 Rand, E. L., Arceuthobium pusillum at Mt. Desert, 75.
 Rangeley Region, Arceuthobium, in the, 28.
 Ranunculus acris, subsp. Friesianus, 40; Allenii, 161, 167; Boreauanus, 39; pygmaeus, 161, 167.
 Raphanistrum Raphanistrum, 51.
 Raphoneis ampiceros, 137; belgica, 137, var. intermedia, 137; gemmi-fera, 137; Surirella, 138.
 Raspberry, Black, 4; Flowering, 5; Purple, 5; Red, 4, Sow-teat, 5.
 Razoumowskia, 54.
 Reboulia hemisphaerica, 73.
 Record of Color Varieties of Gratiola at Westfield, a clerical Error, 195.

- Red Algae, 90; Currant, 1; Raspberry, 4; Spruce, 109.
- Rediscovery of *Podostemon ceratophyllus* in Vermont, 220.
- Rehder, A., *Quercus prinoides* Willd., var. *rufescens*, n. var. 60; Some new or little known Forms of New England Trees, 109.
- Reports on the Flora of the Boston District,—I, 81.
- Retrograde Color Varieties of *Gratiola aurea*, 122.
- Reynolds, E. S., The Flora of the great Swamp of Rhode Island, 117.
- Rhabdonema adriaticum, 138; arcuatum, 138.
- Rhamnus alnifolia, 162, 189.
- Rhaponticum, 48; subgen. *Alfredia*, 48.
- Rhexia virginica, 120.
- Rhinanthus, 24, 26; *Crista-galli*, 23–26, an introduced Plant? 26; minor, 23; **oblongifolius**, 24, 25, 163, 166, 190; of Quebec and New Hampshire, The alpine, 23.
- Rhizoclonium, 200.
- Rhizosolenia styliformis, 138.
- Rhode Island, Flora of the great Swamp of, 117.
- Rhododendron, 187; canadense, 162, 187, 189; lapponicum, 162, 169, 174, 182; maximum, 120, 187; nudiflorum, 122; Rhodora, 187.
- Rhoiconeis trinodis, 134.
- Rhoicosphaenia curvata, 136.
- Rhus copallina, 121; glabra, var. *laciniata*, 115; *hirta*, 115, var. *laciniata*, 115; *typhina*, 115, forma **dissecta**, 115, forma *laciniata*, 115, var. *laciniata*, 115.
- Rhynchospora, 53; capillacea, 159, 189; fusca, 119; macrostachya, 119.
- Ribes albinervium, 3, 4; lacustre, 63; oxyacanthoides, 63, 181, var. *calicicola*, 2; rubrum, 1, 3, var. *sativum*, 3, var. *subglandulosum*, 3; *tristre*, 3, var. **albinervium**, 4; *vulgare*, 1, 3, and its indigenous Representatives in eastern North America, 1.
- Riccardia latifrons, 66; palmata, 73; sinuata, 73.
- Riccia, 56; canaliculata, 56; fluitans, 56, var. *Sullivantii*, 56; Huebeneriana, 56; *Sullivantii*, 56.
- Ricciella, 56, 57; crystallina, 57; fluitans, 57; **Sullivantii**, 56, 57.
- Riddle, L. W., *Notothylas orbicularis* in Massachusetts, 219.
- Robinson, B. L., *Maclura pomifera* (Raf.) Schneider, 148; The scientific Name of the Osage Orange, 91.
- Roestelia, 195.
- Roque Bluffs, Maine, in 1907, Noteworthy Plants collected at, 218.
- Rosa, 37; *Beatricis*, 39; *glutinosa*, var. *leioclada*, 40; *Jundzillii*, var. *leioclada*, 40; *villosa*, 50.
- Rosaceae, 37, 78.
- Rubi, 4; Connecticut, 4.
- Rubia, 52.
- Rubus, 52; *alleganiensis*, 5, 6; *Andrewsianus*, 6, 10; *arcticus*, 24, 162, 169, 189, 190; **ascendens**, 9; *Baileyanus*, 6; *canadensis*, 6, 10; *castoris*, 162; *Chamaemorus*, 150–152, 157, 162, 166, 177, 180, 181, 218, 219; *cuneifolius*, 5; *floricornus*, 6; *frondosus*, 6; *hispidus*, 10; *invisus*, 6; *neglectus*, 5; *nigricans*, 8; *nigrobaccus*, 5, var. *Gravesii*, 6; *occidentalis*, 4, 5, × *strigosus*, 5; *odoratus*, 5; *pergratus*, 10; *procumbens*, 6, 8; *recurvans*, 6, 8; **Rosbergianus**, 7; *semisetosus*, 8, 10; *setosus*, 8, 9; *strigosus*, 4, 5; *subuniflorus*, 6; *triflorus*, 5, 162, 169, 190.
- Rules for Botanical Nomenclature chiefly of Vascular Plants, International, 33; of Botanical Nomenclature adopted by the Vienna Congress, On the, 29.
- Rumex, 37.
- Rumicoideae, 37.
- Rynchospora, see Rhynchospera.
- Sabbatia campestris, 207; *chloroides*, 14, 119.
- Sagina saginoides, 161, 167.
- Sagittaria Engelmanniana, 121; *latifolia*, 121.
- Salicaceae, 37.
- Salicornia, 200, 204; *annua*, 204; *europaea*, 204–206, and its Representative in eastern America, 204, var. *fruticosa*, 204, var. *herbacea*, 204, var. **pachystachya**, 206, var. **prostrata**, 206, *fruticosa*, 205; *herbacea*, 204–206, var. *pachystachya*, 205, 206; var. *prostrata*, 206; *prostrata*, 205, 206; *rubra*, 206; *sempervirens*, 204.
- Salisbury, Connecticut, Noteworthy Plants of, 74.
- Salix, 37, 157; *adenophylla*, 225, 226; *amplifolia*, 222; *argyrocarpa*, 24, 154, 160, 166, 190; *aurita* × *caprea*,

- 41; aurita \times cinerea \times repens, 42; balsamifera, 156, 160, 189; Barclayi, 160, 190; 221; Barrattiana, 226; candida, 179; caprea \times daphnoides, var. pulchra, 42; \times capreola, 41; chlorolepis, 160, 167; coactilis, 203, 204; **coactilis** \times **cordata**, 203; cordata, 203, 204, 224, 226; desertorum, 155, 160, 167, var. stricta, 160; fuscescens, 221, 224, var. **hebecarpa**, 224; glauca, 160, 172, 190; glaucophylla, 222, 224; herbacea, 160, 166; **laurentiana**, 221, 222; lucida, var. intonsa, 222; myrtilloides, 224; **obtusata**, 223; pedicellaris, 160, 189, 224; pellita, 222, 224; phylcifolia, 153, 154, 156, 160, 166, 190; pseudo-myrsinites, 160, 189, 190, 221; pyrolaefolia, 223, 224; Richardsoni, var. Macouniana, 221; rostrata, 222, var. **luxurians**, 223; speciosa, 226; \times Straehleri, 42; **syrticola**, 225, 226; Uva-ursi, 154, 156, 160, 166; vestita, 24, 160, 172, 190.
- Salsola linearis*, 142, 143, 145, 146; *maritima*, 144, 146; *salsa*, 142, 143, 146, var. *americana*, 143, 144, 146.
- Saltwort, 204.
- Salvia oxyodon*, 42.
- Samphire, 204.
- Saponaria, sect. *Vaccaria*, 48.
- Sarcoscyphus* Ehrharti, var. *erythrorhizos*, 57; *sphacelatus*, var. *medius*, 57; *Sullivantii*, 57.
- Sarracenia purpurea*, 120.
- Satyrion, 48.
- Savastana, 53.
- Savia, 54.
- Saxifraga aizoides*, 154, 161, 167, 172; *Aizoön*, 154, 161, 166, 172; *aspera*, subsp. *aspera*, 47; *autumnalis*, 154; *caespitosa*, 162, 183; *nivalis*, 161; *oppositifolia*, 154, 161, 166, 172, 183, 185; *rivularis*, 154, 155, 161; *stellaris*, var. *comosa*, 155, 161.
- Saxifrages*, 153, 154.
- Scabiosa Olga*, 39.
- Scandalida*, 54.
- Scandix Pecten*, 39; *Pecten-Veneris*, 39.
- Scapania apiculata*, 71; *glaucocephala*, 72; *umbrosa*, 71.
- Scheuchzeria palustris*, 207.
- Schizonema crucigerum*, 135; *viridulum*, 135.
- Schizonotus*, 54.
- Schneider, E. S., *Acanthospermum australe* at Lawrence, Massachusetts, 26.
- Schoberia maritima*, 144.
- Schrebera*, 50.
- Sciadophyllum heterotrichum*, 43.
- Scientific Name of the Osage Orange, 91.
- Scirpus*, 220; *caespitosus*, 156, 159, 189, 190; Olneyi, A new Variety of, 220, var. **contortus**, 220; *pauciflorus*, 159, 189.
- Scoliopleura*, 126, 128, 130; *latestriata*, 135, var. *Amphora*, 135; *tumida*, 135.
- Scoria, 53.
- Scribner, F. Lamson, Notes on Muhlenbergia, 17.
- Scrophularia leporella*, 14; *marilandica*, 14.
- Scrub Oak, 60.
- Scutellaria lateriflora*, 122; *parvula*, 75.
- Seaweeds, 91.
- Sebastiano-Schaueria, 51.
- Selaginella selaginoides*, 158, 170, 174, 189, 190.
- Senecio Balsamitae*, 164, var. *firmifolius*, 164; *discoideus*, 164, 191; *pauciflorus*, 164, 191.
- Shepherdia*, 54, 179; *canadensis*, 162, 167, 172, 179.
- Sibbaldia procumbens*, 154, 162, 177, 178.
- Silene acaulis*, 161, 169.
- Silybum*, 55.
- Simaruba*, 45; *amara*, var. *opaca*, 45; *laevis*, 45.
- Simarubaceae, 45.
- Siphonocladus*, 200.
- Sisymbrium altissimum*, 227.
- Sium cicutaefolium*, 122.
- Skunk Spruce, 76.
- Smilacina*, 53; *trifolia*, 218.
- Snake Spruce, 110.
- Society, Bulletin of the Josselyn Botanical, 196, Meeting of the Josselyn Botanical, 107, 124.
- Soil Preferences of certain alpine and subalpine Plants, 149.
- Solidago*, 157; *ambigua*, 164; *bicolor*, var. *concolor*, 164; *decumbens*, 155, 164, 167; *macrophylla*, 218, var. *thyrsioidea*, 164; *multiradiata*, 28, 164, 191; *odora*, 122; *puberula*, 122; *sempervirens*, 15; *uliginosa*, 122; *Virgaurea*, 154, var. *alpina*, 156, 164, 166.
- Some new green Algae, 197; New or little known Forms of New England Trees, 109; New Willows of eastern America, 221.
- Sophranthe*, 123.

- Sorbaria, 54.
 Sorrel, 154.
 Sow-teat Raspberry, 5.
 Sparganiaceae, Preliminary Lists of New England Plants,—XX, 86.
 Sparganium affine, 89; americanum, 86, 87, 121, var. **androcladum**, 86, 87, var. Nuttallii, 87; androcladum, 87; angustifolium, 86, 87, 89; diversifolium, 86–89, var. **acaule**, 86–89, proles nanum, 88; eurycarpum, 86; fluctuans, 86, 87, 90; **lucidum**, 86, 87, 90; minimum, 86, 90; multipedunculatum, 89; nanum, 88; Nuttallii, 87; ramosum, 87; simplex, 86–90, var. **acaule**, 88, var. americanum, 87, var. angustifolium, 89, var. multipedunculatum, 89; var. Nuttallii, 87.
 Spartium biflorum, 51.
 Spathyema, 53.
 Species of Penium, New England, 227; of Pleurotaenium, Synopsis of the New England, 101.
 Spergularia, 54; arvensis, 121.
 Spermatophyta, 152, 157, 187.
 Sphagnum, 120, 183.
 Sphenolobus exsectus, 71; minutus, 73.
 Spiesia, 54.
 Spina, 51.
 Spiranthes, 53; gracilis, 121; Romanzoffiana, 207.
 Spirulina, 131.
 Sporobolus, 23.
 Spruce, Black, 28, 208; Cat, 76; Red, 109; Skunk, 76; Snake, 110; Swamp, 75; White, 75, 76, 208.
 Stachyotypus, 37.
 Stachys § Stachyotypus, 41.
 Staphylea, 49.
 Staphylis, 49.
 Statice sibirica, 155, 163, 167, 174, 186.
 Stations for Chamaecyparis on Long Island, New York, New, 74; for two Vermont Plants, New, 227.
 Stauroneis, 125, 126, 131; acuta, 126, 128, 134; gracilis, 134; Gregoryi, 134; nova, var. britanica, 126, 134; phoenicentron, 134; salina, 134; spicula, 134; Stodderi, 134; Terryi, 126, 134.
 Stellaria borealis, 63.
 Stenocladium, 17.
 Stephanodiscus niagarae, 139.
 Stephanopyxis appendiculata, var. intermedia, 139; corona, 139; ferox, 139; turris, 139, var. intermedia, 139.
 Stipa, 44.
 Streptanthus heterophyllus, 45.
 Streptopus, 106; amplexifolius, 106, 107; oreopolus, 106, 107, A possible Hybrid, 106; roseus, 106, 107.
 Strong, M. A., Further information regarding the Occurrence of Dryopteris Filix-mas in Vermont, 27.
 Suaeda, 54, 140, 143, 144; **americana**, 146; in northeastern America, The Genus, 140, linearis, 141–146, var. ramosa, 143, 144, 146; maritima, 140–145, var. vulgaris, 144; microsperma, 145; **Richii**, 145, 219.
 Subularia aquatica, 161.
 Sueda, 146.
 Sumach, 109.
 Surirella, 127, 131; angusta, 137; biseriata, 136; cardinalis, 127, 137; constricta, 137; elegans, 127, 131, 136, var. norvegica, 136; fastuosa, 127, 137, var. lata, 137; Febigerii, 128, 137; gemma, 137; gracilis, 127, 137; linearis, 136; Moelleriana, 137; nobilis, 131; ovalis, 137, var. angusta, 137; recedens, 137; robusta, 136; saxonica, 127; splendida, 127, 136; striatula, 127–130, 137, var. triplicata, 137; tenera, 127, 136; Terryi, 127, 137.
 Swamp of Rhode Island, The Flora of the great, 117; Spruce, 75.
 Symplocarpus, 53.
 Syndendrium diadema, 139.
 Synedra affinis, 137; danica, 137; pulchella, 137, var. Smithii, 137; superba, 137; ulna, var. danica, 137.
 Synopsis of the New England species of Pleurotaenium, 101.
 Tabellaria flocculosa, 138; fenestrata, 138.
 Tamus, 49.
 Tapeianthus, 43, 50.
 Taraxacum, 55; ceratophorum, 164, 191.
 Tephrosia, 54.
 Terpsinoe americana, 138; musica, 188.
 Terry, W. A., Causes of Variation in Color of some red Algae, 90; A partial List of Connecticut Diatoms with some account of their Distribution in certain Parts of the State, 125.
 Tetragonanthus, 55.
 Tetragonolobus, 48, 54; Scandalida, 48; siliquosus, 48.
 Thalietrum alpinum, 161.
 Thamnos, 49.
 Thirteenth Annual Field Meeting of

- the Vermont Botanical and Bird Clubs, 108; Annual Meeting of the Josselyn Botanical Society, 107.
- Thistle, Blessed, 28.
- Three Plants from Maine, 202.
- Thuspeinata, 43, 50.
- Thymus Serpyllum, var. angustifolius, 40.
- Tillaea, 49.
- Tillia, 49.
- Tissa, 54.
- Tofieldia glutinosa, 160, 172, 189; palustris, 160.
- Torresia, 53.
- Tovaria, 53.
- Toxylon, 54; aurantiacum, 91; Mac-lura, 91; pomiferum, 91.
- Tragus, 53.
- Trees, Some new or little known Forms of New England, 109.
- Triceratium, 130; alternans, 139; flavum, 139.
- Trichochloa, 17, 18; foliosa, 19; glomerata, 22; longiseta, 18; mexicana, 18; sobolifera, 18.
- Trichochloa § Acroxis, 18; § Stenocladium, 17.
- Tricoccae, 37.
- Trichilia alata, 50; pterophylla, 50.
- Trifolium, 37.
- Trifolium hybridum, 121.
- Trillium cernuum, 121; undulatum, 121.
- Triodon, 53.
- Trisetum melicoideum, 159.
- Tristegineae, 50.
- Tristegis, 50.
- Tropidoneis seriata, 135; zebra, 135.
- Tuber, 51; cibarium, 51.
- Tuberaria, 46.
- Tubiflorae, 37.
- Ubochea, 38.
- Umbelliferae, 37.
- Unifolium, 53.
- Uromyces Fabae, 39.
- Uropedium, 50.
- Urticaceae, 37.
- Urticales, 37.
- Urticastrum, 54.
- Urvillea, 38, 52.
- Utricularia biflora, 119; clandestina, 119; cornuta, 119; gibba, 119; inflata, 119; intermedia, 119; resupinata, 119; subulata, 119.
- Vaccinium, 187; atrococcum, 119; caespitosum, 154, 156, 163, 190; canadense, 75, 156, 163, 169, 189; ovalifolium, 163, 177, 178, 188, 190, 191; Oxycoccus, 163, 190, 218; pal-lidum, 119; pennsylvanicum, 181, 187, var. angustifolium, 156, 163; uliginosum, 154, 156, 163, 169, 174, 177, 182, 190; Vitis-Idaea, 181, var. minus, 156, 163, 169, 170, 177, 189, 191.
- Vagnera, 53.
- Valentinia, 53.
- Valeriana sylvatica, 163, 190; uliginosa, 163.
- Variations of Primula farinosa in north-eastern America, 15.
- Varieties of Gratiola at Westfield, a clerical Error, Record of Color, 195; of Gratiola aurea, The retrograde Color, 122.
- Variety of Houstonia caerulea, Alpine, 209; of Scirpus Olneyi, A new, 220.
- Vaucheria, 200; **Gardneri**, 201, 202, forma **tenuis**, 201; geminata, 201, 202; **longipes**, 201, 202.
- Verbena hastata, 122.
- Vermont Botanical and Bird Clubs, 108; Further Information regarding the Occurrence of Dryopteris Filix-mas in, 27; Plants, New Stations for two, 227; Rediscovery of Podostemon ceratophyllus in, 220.
- Vernonia, 55; noveboracensis, 122.
- Veronica alpina, 25, 154, var. unalaschensis, 24, 163, 166, 190; Anagallis, 39; Anagallis-aquatica, 39.
- Viburnum cassinoides, 122; dentatum, 122; pauciflorum, 154, 163, 169, 190.
- Vienna Congress, On the Rules of Botanical Nomenclature adopted by the, 29.
- Vincetoxicum 49; nivale, 43.
- Viola, 93, 151; affinis, 93, 94; arenaria, 13; asarifolia, 95, 96; blanda, 93; canina, var. Muhlenbergii, 151, 162; carolina, 96, 97; conspersa, 151, 162; cordifolia, 98; cucullata, 93, 94; cuspidata, 96; Dicksonii, 96; fibriatula, 96; **hirsutula**, 98, 211-213, 215; **hirsutula** × **papilionacea**, 98, 211, 213, 214; hirta, 41; labradorica, 162; laetecaeerulea, 96; Mendel's Law of Dominance in the Hybrids of, 211; nephrophylla, 162, 189, 216; nodosa, 96; obliqua, 93, 94; palmata, var. dilatata, 96; palustris, 162; papilionacea, 93, 94, 96, 98, 211-213, 215, × villosa, 98; pedata, 121; rotundifolia, 93; sagittata, 13; sep-

- tentrionalis, 95; sororia, 94, 95, 98;
 tricolor, var. hirta, 41; villosa, 95-98,
 var. cordata, 98, var. cordifolia, 95,
 98.
- Violets, The older Types of North
 American,— I, 93.
- Vitis Idaea, 154.
- Volvulus, 55.
- Wahlenbergia, 48.
- Ware, R. A., Reports on the Flora of
 the Boston District,— I, 81.
- Weed, Mormon, 26.
- Weigelas, 147.
- Westfield, a clerical Error, Record of
 Color Varieties of Gratiola at, 195.
- Westford, Massachusetts, Alchemilla
 pratensis found at, 92.
- Wheeler, L. A., New Stations for two
 Vermont Plants, 227.
- White Oak, 61; Spruce, 75, 76, 208.
- Wickstroemia, 49.
- Willows, 221; of eastern America,
 Some new, 221.
- Willugbaeya, 55.
- Witches' Brooms, 28, 75.
- Woodsia, 85; alpina, 154, 158, 166, 172;
 glabella, 154, 158, 166, 172; ilvensis,
 85; obtusa, 85; oregana, 158; sco-
 pulina, 158.
- Woodward, R. W., Notes on Connecti-
 cut Plants, 10.
- Woodwardia, 82; augustifolia, 82;
 areolata, 82, 83; virginica, 82, 124.
- Wormia, 47.
- Xyris caroliniana, 119, 120; flexuosa,
 120, 121.
- Zatarhendi, 44.
- Zygadenus, 193; chloranthus, 160, 170.

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